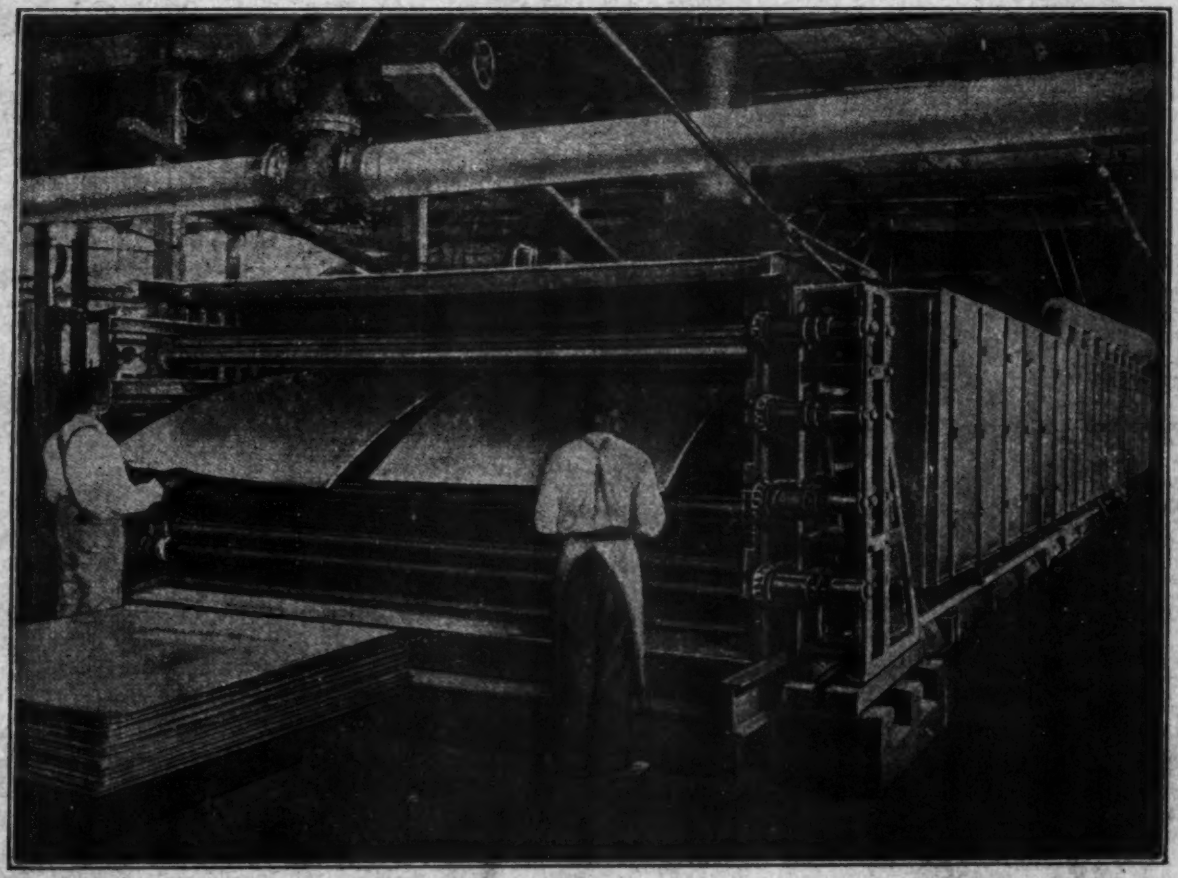
Vol. 4 FEBRUARY, 1923 No. 11

TECHNOLOGY DEPARTMENT
First Copy

THE PAPER INDUSTRY

The Monthly Educational Journal of the Paper Industry.

Multiple Deck Roller Drying Machines



For quickly drying wet machine and press products. If a flat, smooth, uniformly dry product, delivered continuously and cheaply counts, this is the drying system to employ. We also build special drying machines for drying pulps for shipment and paper makers' chips. Estimates furnished for any capacity.

DRYING MACHINE CORPORATION OF AMERICA, Inc.

52 Vanderbilt Avenue, New York, N. Y.

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During Convention Week April 9th-14th, 1923

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THIS Exposition will attract the paper buyer. The greater his need for paper, the greater his interest in an Exposition that tells the story of the paper industries from the forest to the finished product. You have a story to tell about your products. The best way to tell it is by exhibiting what you make to the man who buys. It is *your* Exposition. Get the most out of it.

1st
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Week Commencing
APRIL 9th-1923
GRAND CENTRAL PALACE
NEW YORK CITY
Management
INTERNATIONAL EXPOSITION CO.

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PAPER INDUSTRIES EXPOSITION

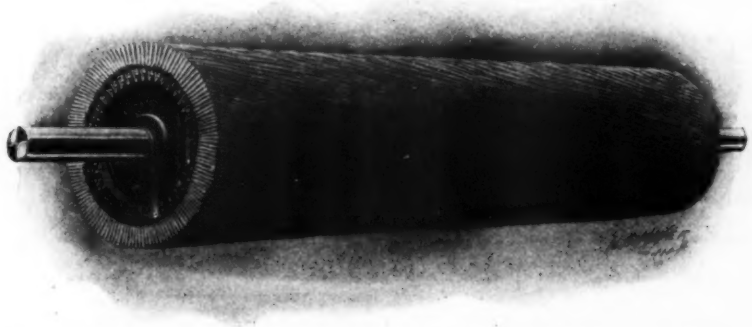
Grand Central Palace **New York City**

Wood Suction Box Covers

To the Paper Mill Manager

OUR WOOD SUCTION BOX COVERS are drilled from both sides, making perfectly *straight and smooth holes,* also making the surface on both sides *absolutely smooth,* which insures the rubber heads making a good, tight joint, also *increasing the life of the wire.* We have a machine especially designed for making Wood Suction Box Covers in the most *satisfactory* and *economical* manner, and we are prepared to furnish any quantity of Wood Suction Box Covers at a *considerably low cost.*

The Hoffman Patented Couch Roll for Cylinder Paper Machines



A MOST VALUABLE IMPROVEMENT for cylinder machines.
Always soft and in PERFECT CONDITION.
INCREASES PRODUCT OF MACHINE.
PAPER OF BETTER QUALITY PRODUCED.
Superior to rubber rolls.
ESPECIALLY VALUABLE ON BOARD MACHINES.
OVER 2,000 IN OPERATION.

Booklet Upon Request

The Moore & White Company

Established 1886

Office and Works, North Philadelphia Station, P. R. R.
Philadelphia, U. S. A.

Vol. 4—No. 11

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

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356 Monadnock Block Tel. Wabash 7327 Chicago, Ill., U. S. A.

Eastern Office: 53 Park Place, New York City

Sulfite Bond Papers

The paper dyes offered by this company are prepared with special reference to the specific purposes for which they are intended. Our experience has proved that the most satisfactory results are obtained only after painstaking care in the selection of proper dyes.

We are therefore publishing in this paper a series of advertisements giving our recommendations for the types which we consider are best suited for the coloring of various kinds of papers.

The manufacturers of sulfite bond require dyes which will be permanent during the effective life of the paper which they color. Economy of use, and ease of application are both important considerations.

"National" direct and acid dyes form the main dependence of the sulfite bond dyer in view of these requirements and the character of the raw material used.

The following list of sulfite bond dyes will give a full range of shades in general demand:

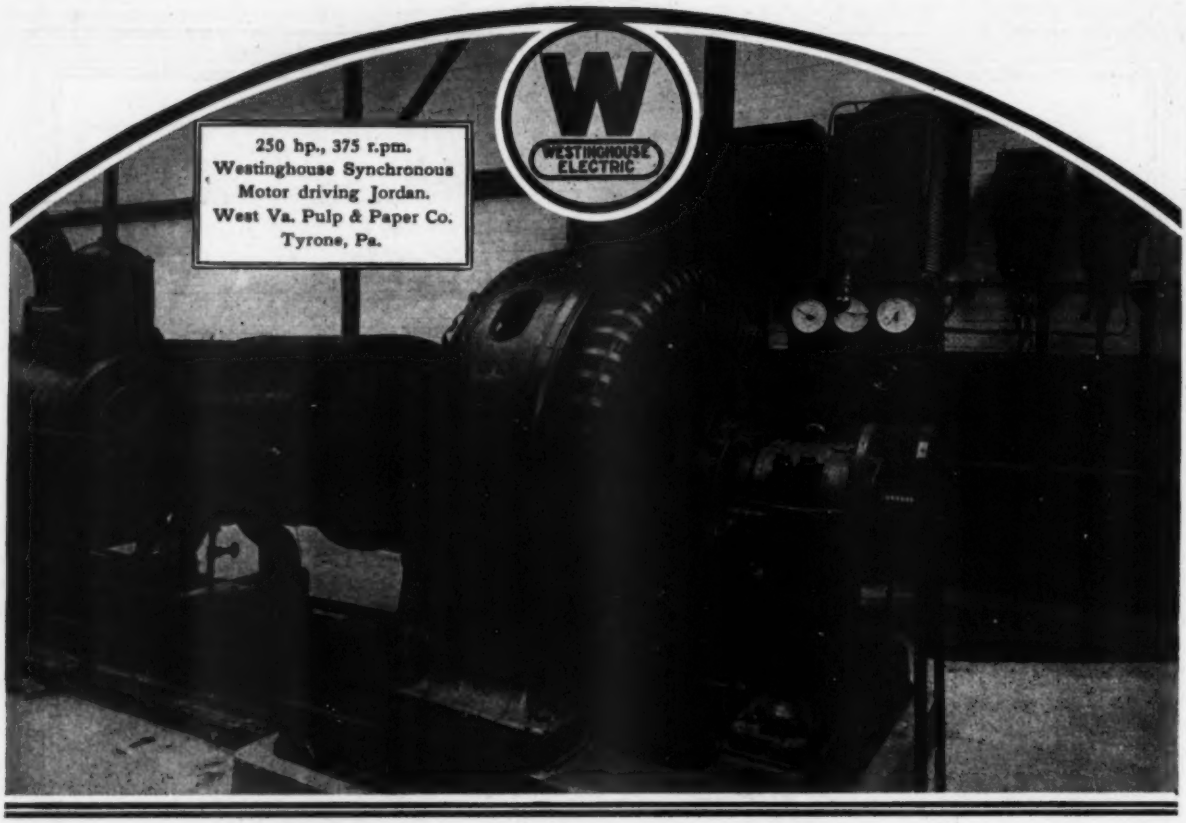
National Quinoline Yellow P
National Chrysophenine Y P
National Brilliant Paper Yellow C
National Erie Yellow 2 R F P
National Acid Orange Y P
National Erie Brown C N P
National Croceine Scarlet M O O P
National Erie Fast Scarlet 4 B A P
National Erie Fast Pink B B P
National Acid Violet 4 B N P
National Fast Tinting Blue R
National Pure Soluble Blue B
National Niagara Sky Blue 6 B P
National Acid Black N B R P
National Acid Green L P Extra
National Acid Green B P
National Nigrosine 128 B P

Co-operation in working out all color problems and a readiness to assist in every way within its power in the production of colored stock of high quality, is an important part of the service offered by the Company.

National Aniline and Chemical Company, Inc.

40 Rector Street, New York, N. Y.

New York *Chicago* *Charlotte* *Toronto* *Philadelphia*
Boston *Hartford* *Montreal* *Providence* *San Francisco*



The use of Westinghouse synchronous motors for Jordan drive is followed by a marked improvement in plant power factor—

ADVANTAGES

In addition to improved power factor secured by the use of Westinghouse Synchronous Motors for Jordan drive, motor drive permits of the best arrangement of machines for the paper making process.

Line shafting and belt maintenance is eliminated, power cost reduced and highest overall plant efficiency attained.

Power consumption can be measured by electrical instruments and inconsistencies in plant operation readily traced to the offending cause.

The Jordan, with its fairly constant load and low starting torque, is an ideal machine for synchronous motor drive.

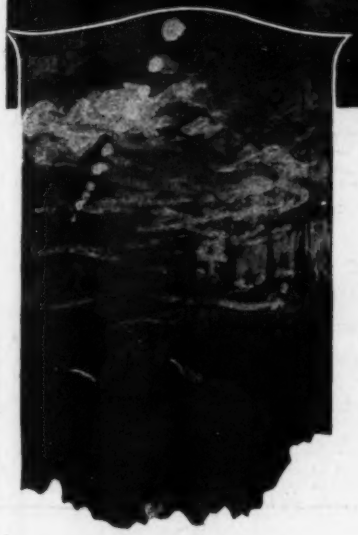
When Jordans are synchronous-motor-driven you secure not only the benefits of motor drive over the line shaft and belt method, but also improved line conditions and power factor correction.

While some paper manufacturers prefer synchronous motors exclusively for Jordan drive, others install them only in sufficient number to effect the much desired result—power factor correction.

Write our nearest district office for complete information on the benefits of Westinghouse Synchronous Motor Drive.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.
Sales Offices In All Principal American Cities.

Westinghouse



Arex engineers reveal hidden profits in every industrial field

VENTILATION performs its *greatest* service in the industries.

Not only does it make the workers of America healthier, happier and contented, but in thousands of instances it saves actual dollars every minute by reducing material losses and speeding production.

Arex engineers for more than fifteen years have been correcting profit destroying conditions of every nature. Steam, smoke, heat, fumes, foul air, gas—any menace that may exist in your building has been successfully handled by these experts many times before.

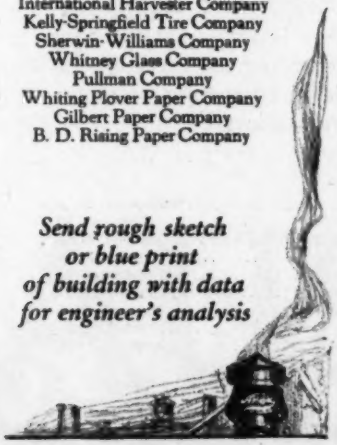
Their corrective system of siphonage ventilation which requires no power equipment is practical for a single room or an entire factory. The low first cost and expense of installation will surprise you—in many cases the savings effected balance them within a few months.

Put your problem before these engineers for consideration. The specification blank below will bring you a complete survey without cost or obligation. Attach rough sketch or blue print of building and address Arex Company, Engineering Division, 1578 Conway Building, Chicago.

World-known leaders in every branch of manufacturing are found on the list of Arex Installations:

Carnegie Steel Company
Packard Motor Company
Bethlehem Steel Company
American Steel & Wire Company
American Car Company
Ford Motor Company
Armour and Company
Standard Textile Products Company
Studebaker Corporation
Stewart Mfg. Corporation
Semet-Solvay Company
Cadillac Motor Company
Sinclair Refining Company
Corn Products Refining Company
Crane Company
International Harvester Company
Kelly-Springfield Tire Company
Sherwin-Williams Company
Whitney Glass Company
Pullman Company
Whiting Plover Paper Company
Gilbert Paper Company
B. D. Rising Paper Company

Send rough sketch or blue print of building with data for engineer's analysis



AREX COMPANY

J. C. Kernchen, Pres.

INDUSTRIAL VENTILATING ENGINEERS

Arex Ventilation Engineering Survey SPECIFICATION BLANK

We desire to receive *Gratis* an engineer's analysis of the following building: ..... *State character of work or business building is used for*

We are troubled with: Fumes ☐ Smoke ☐ Foul Air ☐ Heat ☐ Condensation ☐ Steam ☐

Dimensions of Building: Width.....Ft. Length.....Ft. Ceiling Height.....Ft.

Construction of Building: State whether Brick ☐ Concrete ☐ Frame ☐ Stucco ☐

Type of Roof: State whether Flat ☐ Slant ☐ Gable ☐ Sawtooth ☐ Monitor ☐

Pitch of Roof..... State how many..... inches to the foot.....

Location of Floor or Room to be ventilated.....

How high do adjoining Buildings extend over your Roof?.....

How many feet distant are the surrounding Buildings, or is your Building entirely unsurrounded? .....

....
Firm Name Name of Individual Title of Individual

....
Street Address City State

Eliminating Sunday Work Humanizing An Industry

For many years the Boxboard Industry of the United States has operated on a basis which included Sunday work by many employes. Two shifts of eleven and thirteen hours, respectively, have also been the rule rather than the exception.

A careful investigation and analysis of world-wide experience in the effect of long work shifts and weeks without at least one day of rest led to the belief that the modern tendency to revised working schedules spells higher manufacturing efficiency. It is beyond argument that such revision helps to make better citizens of those in the industry.

These conclusions, whole-heartedly supported by Commissioner Ethelbert Stewart of the Department of Labor, and indirectly affirmed by the President through his suggestions to the steel industry, form the basis on which the undersigned manufacturers of boxboard have revamped their working schedules; to provide at least one full day's rest per week for every employe, and to shorten the shift worked by each employe if and when such adjustments can be made.

The innovation is entirely voluntary. We have not been influenced by labor trouble or the suggestion of it, nor has any Government official requested that it be done. Commissioner Stewart was approached as one whose experience qualified an authoritative opinion, and that opinion was given full weight by each manufacturer in his deliberations and individual action.

We fully believe that through this change in conditions of work our factories will become more efficient and productive, the standard of our products improved, our employes will become better citizens and our service to our trade and the public will be of a higher order.

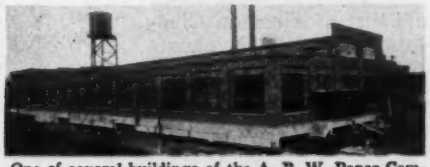
The manufacturers represented publish this advertisement not only for their own selfish benefit, but also because they recognize the great interest now existing in the problem among American manufacturers. Correspondence regarding the investigation and analysis which led to this conclusion may be addressed to individual companies or to the Armstrong Bureau of Related Industries, 400 North Michigan Avenue, Chicago.

ALTON BOX BOARD & PAPER CO.	Alton, Ill.
AMERICAN BOX BOARD COMPANY	Grand Rapids, Mich.
CHESAPEAKE PAPER BOARD CO.	Baltimore, Md.
CHICAGO MILL AND LUMBER COMPANY	Chicago, Ill.
CONSOLIDATED PAPER COMPANY	Monroe, Mich.
CONTINENTAL PAPER CO.	Bogota, N. J.
ROBERT GAIR COMPANY	New York and Chicago
LA FAYETTE BOX BOARD & PAPER CO.	La Fayette, Ind.
McEWAN BROTHERS	Whippany, N. J.
R. B. McEWAN & SON	Whippany, N. J.
MID-WEST BOX COMPANY	Chicago, Ill.
MONROE PAPER PRODUCTS COMPANY	Monroe, Mich.
THE B. F. NELSON MFG. CO.	Minneapolis, Minn.
PHILADELPHIA PAPER MFG. CO.	Philadelphia, Pa.
THE RICHARDSON COMPANY	Lockland, Ohio
RIVER RAISIN PAPER COMPANY	Monroe, Mich.
ROCKFORD PAPER BOX BOARD CO.	Rockford, Ill.
JOHN STRANGE PAPER CO.	Menasha, Wis.

This Austin operation is the Oswegatchie Paper Co. plant now under construction at Gouverneur, N. Y.

Exterior of the Chillicothe Paper Company Plant at Chillicothe, Ohio, completely designed, built and equipped by The Austin Company.

Finished Storage Building interior, the Richardson Company Plant, Chicago.



One of several buildings of the A. P. W. Paper Company, Albany, N. Y., erected by The Austin Company.

The following is a list of Austin clients in the paper, wood pulp and roofing industries:

Flintkote Company, Little Ferry, N. J.; Log Supply Co., Berthierville, Quebec; H. F. Watson Co., Chicago, Ill.; A. P. W. Paper Co., Albany, N. Y.; Arrowhead Mills, Fulton, N. Y.; Bogota Paper and Board Co., Bogota, N. J.; Continental Fibre Co., Newark, Del.; Chillicothe Paper Co., Chillicothe, Ohio; Hinde & Dauch Co., Sandusky, Ohio; Hammermill Paper Co., Erie, Pa.; National Fibre and Ins. Co., Yorklyn, Del.; Peninsular Paper Co., Ypsilanti, Mich.; Richardson Co., Cincinnati, Ohio, and Melrose Park, Ill.; Simplex Paper Corp., Palmyra, Mich.; West Carrollton Parchment Co., Dayton, Ohio; Oswegatchie Paper Co., Gouverneur, N. Y.; Ideal Corrugated Box Co., Parkersburg, W. Va.

Austin Now Building New Oswegatchie Paper Co. Plant

The new plant of the Oswegatchie Paper Co. at Watertown, N. Y., is one of several paper mill operations now under construction by the Austin Company.

Years of experience gained through the designing and building of paper mill buildings for many of the country's well known manufacturers can be applied to your building problem by Austin engineers.

Whether you need 25,000 sq. ft. or 500,000 sq. ft. of floor space in Maine, Wisconsin or in Canada, the Austin Company is prepared to serve you with economy and dispatch.

If you contemplate construction of any kind, Austin Engineers are prepared to furnish you with preliminary data, sketches, approximate costs or even exact costs that will help you to definitely decide upon your building program.

Phone, wire or send the coupon below to the Austin Branch Organization nearest you for this information which will be gladly furnished, irrespective of future business relations.

THE AUSTIN COMPANY, Cleveland

Engineers and Builders

CHICAGO, 1374 Continental and Commercial Bank Building.
CLEVELAND.....16112 Euclid Avenue
DETROIT.....1954 Penobscot Building
PITTSBURGH.....Union Arcade Building
PHILADELPHIA.....1026 Bulletin Building
NEW YORK.....217 Broadway
DALLAS.....627 Linz Building
ST. LOUIS.....1794 Arcade Building
SEATTLE.....1603 L. C. Smith Building
BIRMINGHAM...412 Jefferson Bank Building
LOS ANGELES, The Austin Company of California, 702 Pacific Electric Building.

THE AUSTIN METHOD

AUSTIN

ENGINEERING BUILDING EQUIPMENT

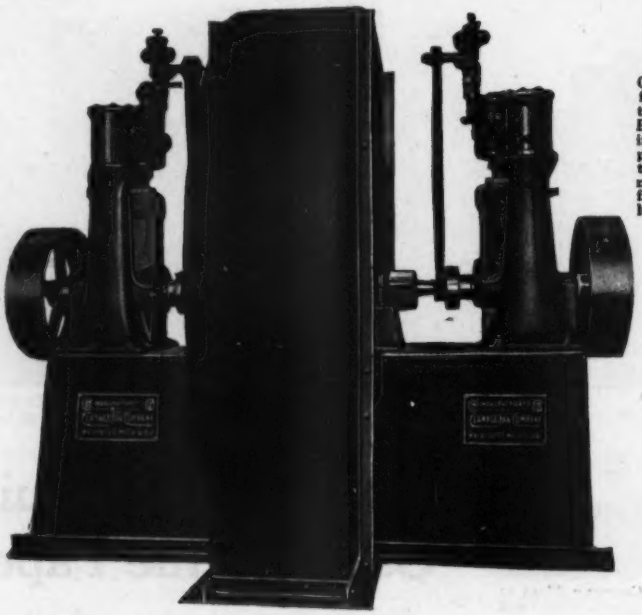
THE AUSTIN COMPANY, Cleveland PI-2-23

We are interested in the erection of a ..... building ..... x ..... ft., ... stories high, and would be pleased to receive a copy of the new edition of "Austin Book of Buildings," without obligation.
☐We are interested in branch plants and warehouses, and would appreciate receiving additional literature and information.

Firm .....

Individual .....

Address .....



Clarage forced draft fan direct-connected to a Clarage Type V Engine—the unfailing combination for paper mills. One of the engines shown is not connected to the fan but is merely held in reserve.

Clarage-Kalamazoo equipment finds many profitable applications in paper mills

IN THE average paper mill, the Engineering Department of the Clarage Fan Co., can point out a great number of money-making and money-saving applications for Clarage-Kalamazoo Systems.

Clarage-Kalamazoo Blower Systems, by keeping mills at just the right temperature during the hottest or coldest weather, make money by keeping workers at highest efficiency throughout the day. Clarage-Kalamazoo Systems cover the needs of all paper mills; they can be used for ventilating alone, or for heating and ventilating as well as humidifying.

By supplying dry, warm air at the roof line, Clarage-Kalamazoo Roof Drying Systems prevent the condensation of moisture on the roof from where it may fall onto new paper.

In pneumatic conveying of paper stock and in dust and dirt elimination Clarage-Kalamazoo Blowers and Exhausters often pay highest dividends.

Clarage-Kalamazoo Blowers, when used in connection with Clarage Type V Steam Engines, provide reliable mechanical draft for the power house.

These uses of Clarage-Kalamazoo equipment are described by Clarage-Kalamazoo bulletins. Ask for the ones you want. But, better still, ask for a consultation with a Clarage representative. He will have fan facts that will surprise you.

Clarage Fan Co., Kalamazoo, Michigan

New York City, Chicago, Los Angeles, Charlotte, N. C.
Indianapolis, Pittsburgh, Detroit, Rochester, N. Y.
Cleveland, Minneapolis, Philadelphia
New England Elec. Equip. Co., Boston, Mass.

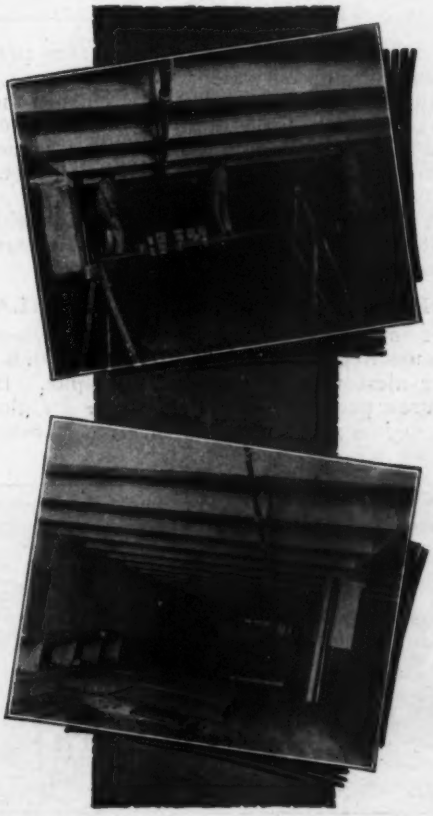
CLARAGE — KALAMAZOO FANS

BLOWERS
EXHAUSTERS
ENGINES

Use This Pure White Paint

Surlight is the whitest mill-white paint made. This is an actual fact that is open to demonstration—results will show that in every case, under similar conditions and service, Surlight is whiter when applied, whiter when dry and stays white longer than any paint or enamel you can buy.

The light-reflecting properties of Surlight paint add daylight to any mill, and this is a vital factor in increased production. In many cases it has actually been found that 8 to 12% more work could be turned out after Surlight had been applied.



Surlight promotes comfort among employees —Surlight painted walls do not glare or dazzle; they lessen eye strain and reduce fatigue. Sanitation and neatness are encouraged — corners and out-of-the-way places brightened up with Surlight are less apt to be used as dumping places for dirt and rubbish.

Surlight has a smooth, hard and non-porous surface. It lasts long, eliminates the necessity of repainting and can be washed as often as desired.

The pictures at the left tell the Surlight story—the next time you paint use this pure white mill-white paint and note the difference.

Get Interesting Book on Surlight

Considers the subject of Surlight Paint from every angle—what it is, what it does and how it should be used to obtain best effects. Send for this book—it will be mailed gratis on request.

We also make paints to meet all the requirements in paper mills

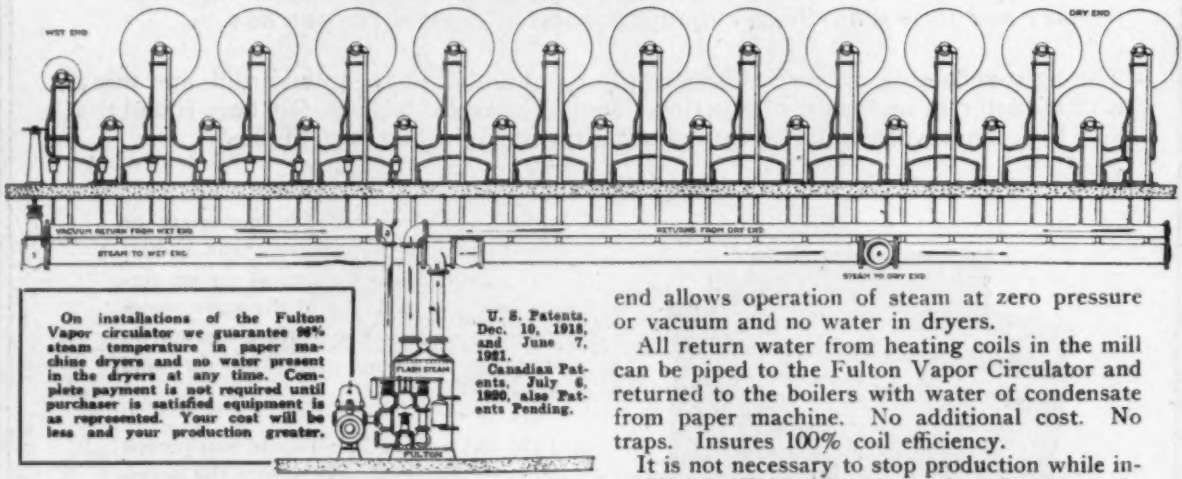
St. Louis Surfacer & Paint Co.
4204 Arlington Ave., St. Louis, Mo.

SURLIGHT

The Light Reflecting Wall Paint for Industrial Purposes

The FULTON Forced Vapor Circulator

Keeps all water out of dryers—
Reduces fuel consumption—
Increases production—



On installations of the Fulton Vapor circulator we guarantee 98% steam temperature in paper machine dryers and no water present in the dryers at any time. Complete payment is not required until purchaser is satisfied equipment is as represented. Your cost will be less and your production greater.

U. S. Patents, Dec. 10, 1918, and June 7, 1921. Canadian Patents, July 6, 1920, also Patents Pending.

THE FULTON FORCED VAPOR CIRCULATOR

The operation and the principle of this system is not in the least complicated. It is, on the other hand, extremely simple as will be readily noted by means of the accompanying drawing. An explanation to this drawing is given briefly in the following:

1.—Return from dry end and steam supply to wet end.
2.—Steam to wet end.
3.—Vacuum return from wet end to pump.
4.—Vacuum pump. Steam or electric pump may be used.
5.—Valve through which air is blown when starting the machine after a period of shut down. **Maximum dryer temperature is thus obtained in fifteen minutes.**
6.—Steam supply to dryers.

Steam pumps 100% efficient by exhausting into the wet end dryers, therefore the cost of removing air and water from the dryers is practically nothing.

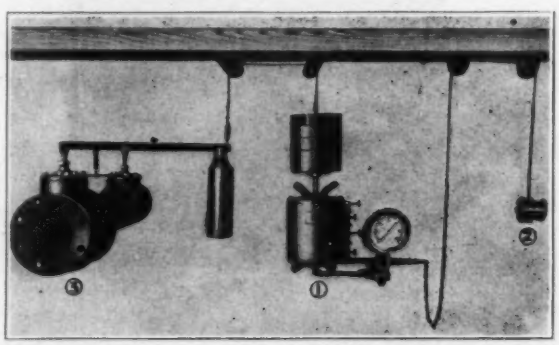
With this system practically 75% of the dryers constitute the dry end of the paper machine. By drying paper with less steam or vacuum on wet end gives a wider, stronger and better finished sheet and prevents cockling. Vacuum on wet end allows operation of steam at zero pressure or vacuum and no water in dryers.

All return water from heating coils in the mill can be piped to the Fulton Vapor Circulator and returned to the boilers with water of condensate from paper machine. No additional cost. No traps. Insures 100% coil efficiency.

It is not necessary to stop production while installing the Fulton Circulator since there are only three connections necessary, 1, 2 and 3.

DEMON STEAM PRESSURE REGULATOR

It is impossible to waste steam where the Demon Regulator is on the job. It stands as an ever alert watch over your coal pile. It also insures perfect steam regulation, for the live steam in inlet and exhaust valves is controlled by the pilot cylinder—1.



U. S. PAT. MAY 3, 1921

The remote control is placed on front side of paper machine—2. One operation of this controls incoming steam and exhaust.

Where this regulator is used, master valves are placed in the steam lines—3.

The Demon Steam Pressure Regulator is built in all sizes and for all pressures.

Why not ask us what we can do for your machine—it costs nothing

The FULTON ENGINEERING COMPANY

MIDDLETOWN, OHIO

Don't Rock the Boat!

THE commercial reports from practically every section of the country during January show that a general expansion of business is proceeding at a healthy rate.

Industry in general is busy with future orders coming in daily for larger volumes, indicating that merchants in all lines are convinced that market and stock conditions warrant future purchases in larger quantities. All this makes for a stabilizing commercial condition.

The factory capacities are not running 100%; the average will not exceed 75%. And this is again a healthy situation, because the country could not at present absorb the 100% factory production of the United States. The reason the factory production is not larger is primarily due to two facts: First, we have not the labor; second, the transportation facilities will not permit it. Intelligent manufacturers see the advantage in maintaining the status quo.

If the steel company, for instance, should attempt to run 100% capacity it could only do so by raising labor prices higher than the present level and, thereby, take the labor necessary to the operation of other industries. This, in turn, would cause other industries to raise their labor wages in self-protection, and then charge back into their commodities the advance cost of labor. This would then be made a basis for further advances by the labor leaders, and thereafter we should have another period of inflation followed inevitably by a consequent deflation of a year or more, when everybody would lose all they made and then some.

Intelligent manufacturers see and know the operation of this immutable economic law, and all other manufacturers ought to have it shown them.

Don't rock the commercial and industrial boat—sit tight, keep cool and maintain the craft on an even keel.

This whole matter is of utmost importance to the paper manufacturers of the United States. There is at present a very great opportunity to boost prices artificially. If it is done it will be a piece of the rankest stupidity on record. Disaster will most certainly overtake them. For the paper industry is at present at a level of cost that is a serious problem to maintain. Consumers fight prices based on present levels of cost. To advance and inflate prices this year will meet the combined resistance of all paper purchasers.

So, our advice to every manufacturer of paper is "Keep your prices steady. Fight against any and all tendencies to inflate costs or selling prices." What goes up uneconomically must come down.

Our present price and cost level have economic bases; they can be maintained.

Don't rock the boat!

Wisconsin wires
I n all meshes
S uitable for paper making purposes
C arefully woven by experts only
O n most modern looms, built
N ot for greatest production, but with
S pecial attention and care given
I n construction of these machines to
N eed of "Quality first."

Wisconsin wires
I ncrease your tonnage
R educe your costs, and
E nlarge your profits.

Wisconsin wires
O f highest quality,
R emarkable life,
K eep their alignment, and have
S eams that neither mark nor break.

APPLETON WISCONSIN

Kenwood Mills, Albany, N. Y.

BOARD MILLS!

Why use heavy, close, expensive plate and B B press felts on 2nd, 3rd and 4th presses?

KENWOOD
ONE-SIDED FINE AND SUPER PRESS FELTS

give the required finish at a higher rate of production and much less cost

KENWOOD WOOL PRODUCTS

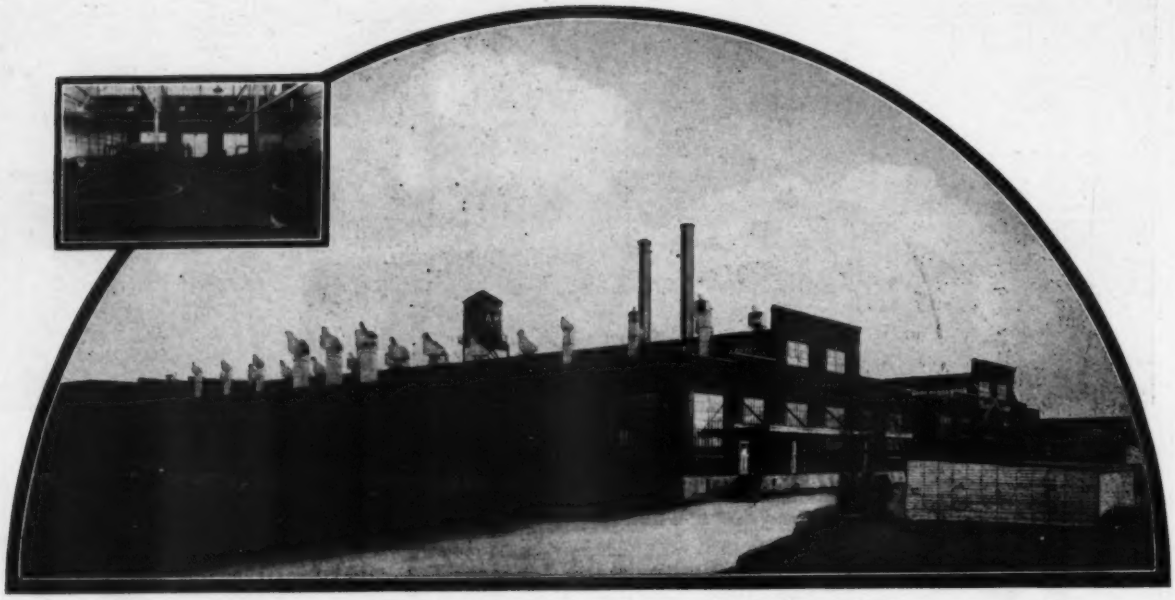
Maximum satisfaction in finish, test, service and production is secured through use of the above felts in combination with Kenwood One-Sided Bottom and Kenwood One-Sided Superfine Top Felts.

F. C. HUYCK & SONS

KENWOOD MILLS, ALBANY, N. Y., U. S. A.

KENWOOD MILLS, LTD. ARNPRIOR, ONTARIO, CANADA

Kenwood Mills Ltd., Arnprior, Ontario



When The A. P. W. Paper Co. took possession of their Liberty Mill (illustrated above) they wrote us: "WE WISH TO CONGRATULATE YOU ON THE EXCELLENT JOB WHICH YOU DID FOR US. NOT ONLY ARE WE PLEASED WITH THE BUILDING ITSELF BUT WE THINK THE TIME IN WHICH YOU COMPLETED THIS BUILDING IS NOTHING SHORT OF MIRACULOUS."

Center the responsibility for your new building —design, construction and equipment—on The H. K. Ferguson Co. and you will save 30 to 60 days in getting action, another 30 to 60 days in erection and moreover get a building that represents the biggest value for every dollar invested. A list of Ferguson customers is a blue book of American industry.

Write, wire or 'phone for complete descriptive hand-book of Ferguson methods or a personal interview (no obligation).

On the job shown above Ferguson engineers saved $20,000 and 30 days' working time by a change in the original plans. The substitution of concrete piles for spread footings accomplished both savings at one stroke. That type of initiative is typical of the Ferguson organization.

THE H. K. FERGUSON COMPANY

Design and Construction of Heavy Industrial and Railroad Projects

HAROLD K. FERGUSON, President

6523 Euclid Avenue, CLEVELAND Phone Randolph 6854

Ferguson

ONE OF AMERICA'S BEST BUILDERS

EDITORIALS

Education

"This is my work, my blessing, not my doom,
Of all who live, I am the one by whom,
This work can best be done in the right way."

WITH this bit of verse from Van Dyke, the Education Committee of the Canadian Pulp and Paper Association closed its report at the recent meeting held at Montreal. And therein lies the principle or rule by which their work is done.

In our opinion one of the most encouraging phases of the paper industry is the increasing interest shown in education relating to processes and operations involved therein. A presentation of the laws and fundamentals in their logical order, used to supplement the practical experience of the mill will undoubtedly elevate paper making to a higher industrial plane—increasing speed, capacity, efficiency and raising the quality of paper. This is a forward looking industry that is devoting time and money to constructive education.

There is, however, one phase of education that is sometimes neglected, that of educating the man in the building up of character. THE PAPER INDUSTRY is primarily an educational journal, and from time to time publishes material designed to educate the **man** as well as the paper maker. In this connection we offer the following anecdote:

Clustered in one of the many coils made by the Snake River—on the Idaho side—is a group of mountains which seem lacking but a few jagged rocks to bring their peaks to the very foundations of heaven. The good folks of that region have rather inconsistently called this group of giants "The Seven Devils." A step which is but a hesitation in the steep descent of one of these mountain sides spreads out into ten or a dozen acres of comparatively level ground. Here, in a rough cabin of spruce logs, lives one of the best educated men ever born; Old Man Lee, he is called. He can neither read nor write, and yet we call him one of the world's best educated men.

Old Man Lee has never studied botany—doubtless has not so much as heard the word; but never was there a professor of botany who made more use of and was a better friend to plant life than was Old Man Lee. Geology means nothing to him. He does not even know that stones have family names; but he knows the stones of the hills and their value to the existence of himself and his fellow beings. Psychology, as a word, is missing from his vocabulary; but he knows the people in the little village at the foot of "The Seven Devils"—knows them through and through. And the occasional stranger never deceives him.

He knows when to sympathize, he knows when and how to scold and when and how to praise, he knows when to be liberal and when to close up, he knows when to distrust a man. And men love Old Man Lee.

Old Man Lee—he cannot read nor write, his vocabulary is limited to but a few simple words, he knows no rules of science, as such; but he knows the rules of nature—and of God. An occasion never arises in the life of Old Man Lee that finds him puzzled. He has adjusted himself to the particular part of this world in which he has to live, and is living as God intended that men should live.

Do schools teach a **better** education?

Most of us, of course, have to adjust ourselves to a somewhat larger portion of the universe than does Old Man Lee. To do this we must have a **broader** education than he ever had. A **better** education is not conceivable.

We do not infer for a minute that schools and colleges lack importance. By all means no! We believe that schools lead the progress of a nation. Our contention is that the best education is that which makes a man live as a man should live and get the best out of what he has. Schools and colleges can inject knowledge into a man's head until there are but few mysteries remaining in the material or abstract world, but they have no monopoly on the process of the building of character, so essential in our industrial relationships.

Tune in

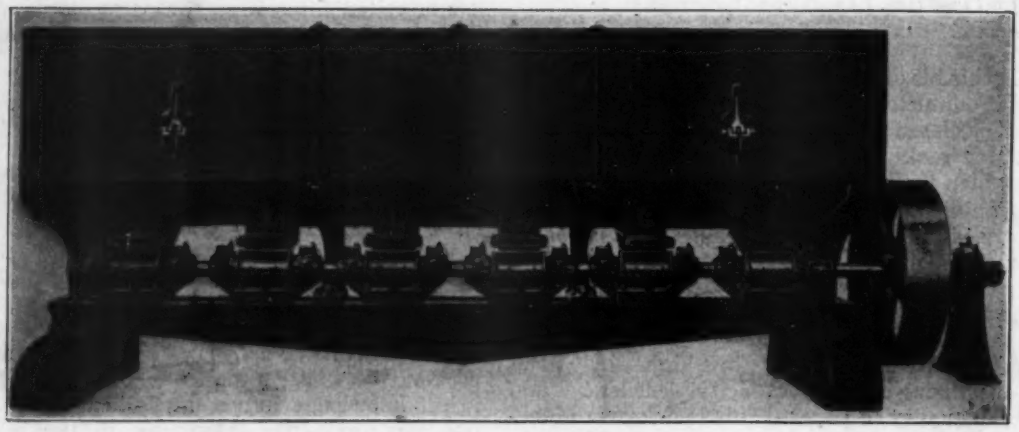
AT THE meeting of the Michigan division of the American Pulp and Paper Mill Superintendents Association, held at Kalamazoo on January 18, a movement was made to seek means whereby a message on the subject of waste paper destruction could be broadcasted to the entire country. Acting upon the suggestion of the committee appointed in charge of this movement, THE PAPER INDUSTRY has prepared an address on this subject and has made arrangements to send this out from a number of large broadcasting stations in various parts of the country.

This address has been prepared in a way to hold the interest of the avearge person who knows nothing of the technical aspects of paper. Its primary purpose is to rouse the public of the country to a realization of the tremendous industrial loss in which they participate every time they uselessly burn paper.

The week extending from February 18 to 24 has been appointed as the period for the national distribution of this message. Aside from radio stations, the press will also lend their aid. We ask the cooperation of the entire industry to put this message over in a way to react by effecting a much needed check on the destruction of waste paper.

On the evening of February 21, 9:15 (Chicago time), the editor of THE PAPER INDUSTRY will personally deliver this address at station WMAQ Chicago.

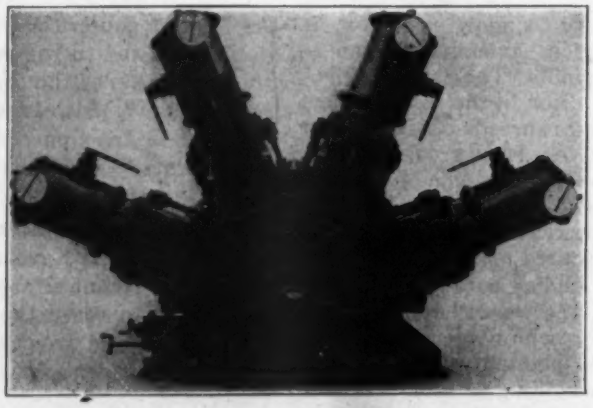
Pulp and Paper Mill Machinery



FLAT SCREENS

Made in All Sizes from 6 to 18 Plates Inclusive

Manufacturers of Screens, 3 and 4 Pocket Grinders, Wet Machines, Disc Barkers, 48″-84″-90″ Chippers, Centrifugal Pumps, Iron, Brass, Bronze and Lead Castings



FOUR POCKET GRINDER

Equipped with All Latest Devices, *including our* Patented Pulp Scraper Between the Pockets

INQUIRIES SOLICITED

Union Iron Works, Bangor, Maine

SKF

Ball Bearings on Squeeze Rolls

Permit Heavy Pressures Without Fear of Wear

WITH plain bearings on squeeze rolls, high pressure cannot be developed without fear of journal wear. It also frequently happens that the mechanism for bringing the squeeze roll up against the dryer roll is such that it is almost impossible to be absolutely sure of keeping the bearings in proper alignment. As a result one end of the squeeze roll will bear more heavily than the other, throwing the bearings out of line.

SKF marked self-aligning ball bearings, on the other hand, will withstand heavy pressures without developing any appreciable wear and the inner race, balls and retainer are free to turn in any direction to compensate for misalignment.

May our engineers submit plans for bringing the freedom from bearing troubles, breakdowns and shutdowns which ball bearings afford, to your present machines?

THE SKAYEF BALL BEARING COMPANY

Supervised by **SKF** INDUSTRIES, INC., 165 Broadway, New York City

199

Normal View *Deflected View*

BALL BEARINGS
The Highest Expression of the Bearing Principle

Entering spigot into bell when laying Bell and Spigot Prepared Joint Cast Iron Pipe. Note the calker's tool kit, which is all he requires.

BELL AND SPIGOT
PREPARED JOINT
CAST IRON PIPE

This product is called Prepared Joint because it is made at our factory in the bell of each pipe and needs only calking in the usual way when placed in the trench.

Prepared Joint is a lead and hemp joint for bell and spigot cast iron pipe, conveying water, other liquids, and gas. As Prepared Joint is factory-made, to complete a joint in the trench it is necessary only to insert a plain-end into a bell and calk the lead. The speed with which it is calked in the trench reduces costs of labor, because the yarning and pouring of joints are eliminated.

Prepared Joint pipe come in twelve-foot and sixteen-foot lengths, in diameters of 4″, 6″, 8″, 10″ and 12″.

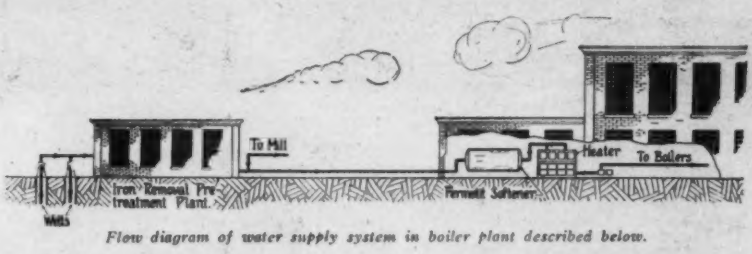
You may have durability of cast iron in this product the same as in flanged pipe and fittings, or standard bell and spigot pipe and fittings, or Simplex low pressure piping, or Simplex Prepared Joint five-foot pipe.

Solving pipe problems is the business of our Research Department. We welcome an opportunity to coöperate with pulp and paper mill operators.

Write for Illustrated Catalogue "P" Describing 2″ Cast Iron Pipe

AMERICAN CAST IRON PIPE COMPANY
BIRMINGHAM, ALA.

DISTRICT OFFICES IN PRINCIPAL CITIES



Flow diagram of water supply system in boiler plant described below.

How a Chief Engineer Rid His 1600 H. P. Boiler Plant of Scale

A large manufacturer in Alton, Ill., has a boiler plant consisting of 4 Toledo Flanner water tube boilers rated at 280 H. P. each, and 1 Badenhausen water tube boiler of 500 H. P. The boilers are operated 24 hours per day at approximately 100 per cent overload, which places a very heavy demand upon the equipment at all times.

The water supply is derived from wells and contains an average of 16 grains of hardness per gallon, with the result that in spite of the use of boiler compounds, scale formerly deposited in boiler tubes and pipe lines very rapidly. Each boiler had to be turbined every two weeks, and the cleaning gang was often hard put to it, to get one boiler back in the line before another one had to be taken off.

The chief engineer, who was a keen, progressive man, decided to rid his plant permanently of these boiler scale troubles, so in February, 1920, after investigating all types of water softeners, they installed Permutit water softening equipment that removes absolutely all scale-forming impurities from 144,000 gallons of boiler feed water in 24 hours.

The results more than justified his good judgment. Scale formation stopped immediately, the old scale in boilers was loosened and easily removed, and since that date every boiler tube has remained clean and bright. A recent letter from the company states in part:

> "Prior to the time that we installed the Permutit Plant, we had a great deal of tube trouble, and were kept very much in doubt at times as to whether or not we would be able to get one boiler repaired and back on the line, before another one would be in such condition as to make it necessary to shut down.
>
> This trouble has been entirely eliminated, as it was caused altogether by scale deposit in our tubes, and we are now able to run our boilers with no scale or sludge whatever during the period which we keep them on."

The Permutit Company manufactures equipment for removing all scale forming impurities from water without the use of chemicals, and we have helped many engineers to solve their boiler plant problems. Our booklet, "Reducing Fuel and Boiler Plant Operating Costs," contains some very valuable data gained from our experience in hundreds of plants. Let us send you a free copy.

Just sign the attached coupon—the booklet is mighty worth while having.

The Permutit Company
440 Fourth Ave. New York

For Your Protection

On June 15, 1921, the Federal Court at Buffalo (Hazel, J.) handed down a decision sustaining our patent covering zeolite water softening apparatus, and stating that this patent "is not limited to any particular class of zeolitic material." The Court also described the apparatus held to infringe, and this description, our counsel advises, applies to all zeolite softeners on the market. Other suits brought by us for infringement are pending.

The above decision has been affirmed by the Circuit Court of Appeals, and the U. S. Supreme Court has denied a petition for a writ of Certiorari to review it.

Send for this free booklet

The Permutit Company
440 Fourth Ave.
New York

Please send me your free booklet, "Reducing Fuel and Boiler Plant Operating Costs."

Name _____

Address _____

Company _____

Preventing Damage by Exhausting Moisture-laden Air

Removal of water vapor resulting from various operations in mills is a vital consideration in the paper industry. The moisture-laden air must be exhausted in great volume to prevent condensation, and consequent deteriorating effect on the building structure.

American Blower Exhaust Units efficiently accomplish this purpose for many of the greatest mills. American Blower equipment also supplies fresh air—heated to the correct temperature—to aid in the various processes of manufacture and to replace that exhausted.

Our engineers have applied American Blower Products to every phase of the paper industry where the handling of air is required. They are well qualified to cooperate with you. Information of interest is contained in our bulletins which will be mailed to you upon request.

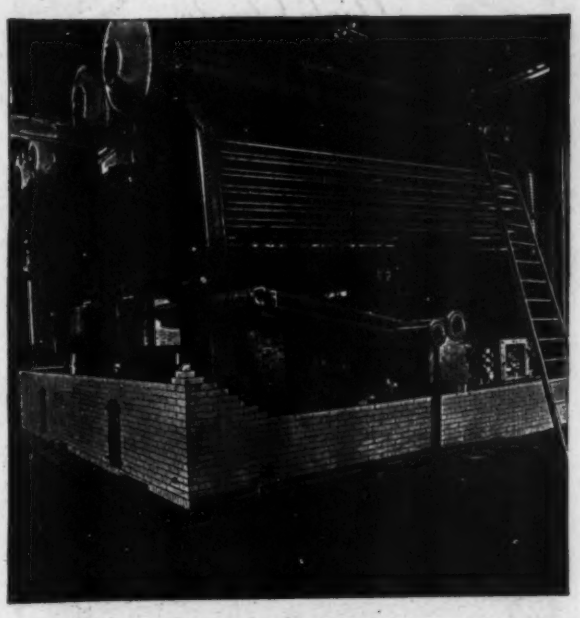
AMERICAN BLOWER COMPANY, DETROIT
BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO CO., LTD., WINDSOR, ONTARIO (218)

American Blower

"Sirocco" TRADE MARK

EXHAUSTERS · VENTILATING FANS · AIR WASHERS · BLOWERS · ENGINES
FOR HEATING, VENTILATING, DRYING,
AIR CONDITIONING, MECHANICAL DRAFT

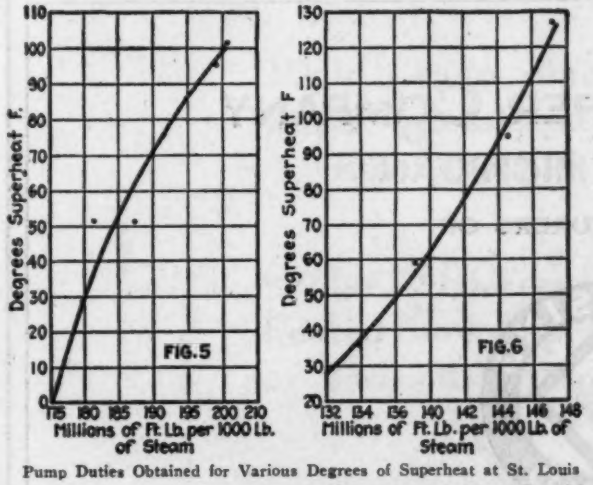
This 5-year experience with FOSTER SUPERHEATERS answers your questions



View of Setting of Boilers at Baden Station, Showing Superheaters in Combustion Chamber

In a paper recently read before the American Water Works Association, Mr. L. A. Day, engineer in charge of the Operating Section of the Water Division of the City of St. Louis, Mo., told of his five-year experience with Foster Superheaters and the marked and consistently maintained improvements in economy effected by the use of superheat on all types of engines. We quote below his conclusions as to the benefits of superheat:

> "The use of superheated steam at all of our plants has proven to be one of the greatest factors in increasing the efficiency of the engine rooms.
>
> "Our triple-expansion engines show a saving for various degrees of superheat as represented by the curve, Fig. 5. The steam saving for 100 degrees superheat amounted to 12.1 per cent., while the saving in coal amounted to 7.5 per cent. The low service compound pumping engines show a saving for various degrees of superheat as represented by Fig. 6. The steam saving for 100 degrees superheated amounted to 17.3 per cent., while the saving in coal amounted to 13.2 per cent. Our turbine driven pumps operated with 124 degrees of superheat show an increase in duty of 15 per cent.
>
> "We found that our lubricating problems were no more difficult with superheated steam than with saturated steam. Our extra heavy cast-iron fittings have given excellent service for five years under superheated steam conditions without showing any apparent signs of weakness.
>
> "The saving in coal due to the introduction of superheated steam at the Chain of Rocks station has been sufficient to pay for the superheaters in about 3½ years. The life of a superheater, when the elements are not exposed to the direct flame, should be equal to the life of the boilers."



Pump Duties Obtained for Various Degrees of Superheat at St. Louis

We are prepared to show you just to what extent the use of superheat can improve your engine economy. Write us for full information and catalog describing the special features of Foster Superheaters that assure the full benefits of superheat with least maintenance expense.

POWER SPECIALTY COMPANY

111 Broadway, New York

Boston Philadelphia Pittsburgh Chicago San Francisco
Detroit Boulder Kansas City Dallas London, England
Plants at Dansville, N. Y., and Egham, England

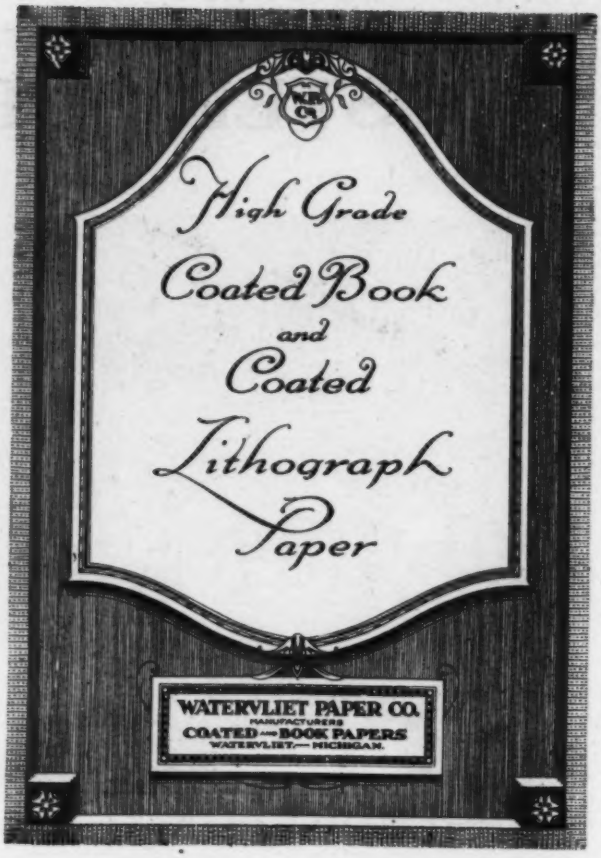
24

FOSTER SUPERHEATERS

MAJESTIC, Steel—ribbed, rock rooted, the 285 ft. K. V. P. smoke stack symbolizes the superior product of the big plant over which it presides.

If you are not acquainted with this organization whose two-fold ideal is "To excel in Paper product and just be good folks to do business with," the latch string is out. Come in!

Kalamazoo Vegetable Parchment Co.
Kalamazoo, Mich.



MUNISING PAPER COMPANY

MUNISING MICHIGAN

MANUFACTURERS OF

MUNISING M BOND

COLOR QUALITY AND UNIFORMITY
HAVE MADE FOR IT
AN ENVIABLE REPUTATION

Oxford Paper Company

Mills at
RUMFORD
MAINE

Executive Offices
200 Fifth Avenue
NEW YORK

Manufacturers of

High Grade Machine Finish and Super-Calendered Book, Lithograph, Envelope and Tablet Papers

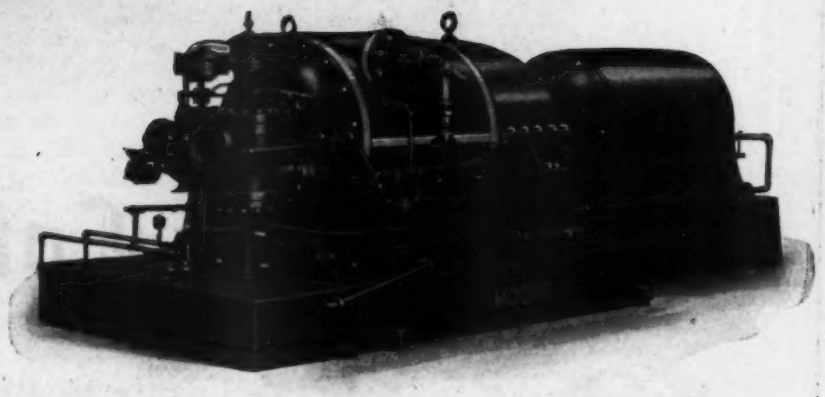
and

"Polar," "Hi-Tone" and "North Star" Coated Book Papers; also Coated One or Two-side Lithograph and Cover

Capacity of Mills: 350 tons of Paper, 150 tons of Soda Pulp, 100 tons of Sulphite Pulp per day

MOORE

"Best at Every Turn"



Sizes up to 1000 K. W.

BLEEDER TURBINE

Pays 100% Dividend Yearly

MOORE

Steam Turbines

Non-Corrosive Buckets
Reamed Nozzles
Large Clearances
Low Speeds
Safe Stresses
Dependable Governors
Horizontally Split Casings and Diaframs
High Steam Economy
Low Steam Velocities
Trustworthy Automatic Control

Simple Design—Honest Construction

Offices in all principal cities

The 300 KW Moore Bleeder Turbo Generator shown above was installed in a paper mill engine room. Exhaust steam at 10 pounds pressure is used for the cooking process.

The immediate result was the saving of 200 boiler horse power—although the same quantity of steam as before was "bled" for cooking and the same power generated.

The yearly saving is over 100 per cent of the purchase price!

Your plant may be losing thousands of dollars annually which a Moore Bleeder Turbine can easily turn into your bank account.

Send us your conditions, and let us tell you, without obligation, exactly the saving which we can effect for YOU.

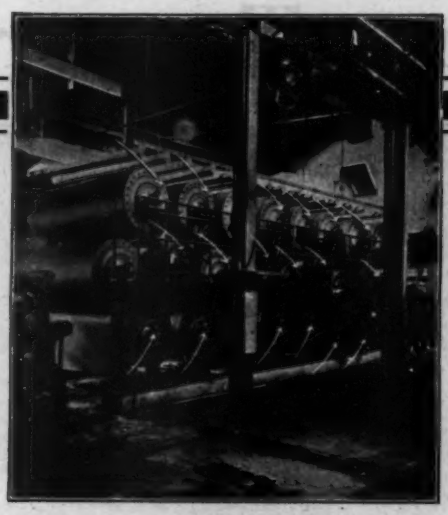
Turbines all types 5 to 1500 H.P. *Turbo Generators up to 1000 K.W.*
Turbo Pumps and Blowers. *Double Herringbone Reduction Gears.*

MOORE STEAM TURBINE CORPORATION

WELLSVILLE, NEW YORK

Sole Canadian Representatives—Darling Brothers, Limited, Montreal

High Heat Resisting—High Lubricating and Friction Reducing Value



On Dryer Rolls, as on other important units, the Venango System is rapidly replacing former methods

IN Keystone-Keyso Greases we are offering a formula which is a remarkable step forward in the development of efficient lubrication of machinery operating under high heat conditions. They combine all the necessary heat resisting properties with a high lubricating value and efficiency. Their use under the severest working conditions of heat have not resulted in decomposition or waste, but, on the contrary, the grease has held in bearings where other lubricants have given little or no satisfaction.

Send for Booklet describing Keystone-Keyso High Melting Point Greases.

Keystone-Keyso

High Melting Point Grease

has been developed after considerable laboratory and practical service research work, and is now in use in many representative American industries giving more economical and efficient service.

Keystone-Keyso Grease is manufactured in 6 densities, numbers 40 to 45 inclusive. Nos. 40, 41, 42 and 43 are supplied in brick form for use in open well boxes. Nos. 44 and 45 are for use in Keystone Hand Compression and Spring Automatic Grease Cups.

THE KEYSTONE LUBRICATING CO.

New York
Boston
Pittsburgh
Chicago
Detroit
Omaha
St. Louis

Executive Office and Works:
Philadelphia, Pa.
Established 1884

Denver
San Francisco
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Agencies in Principal Countries Throughout the World

KEYSO
TRADE MARK
REG. U.S. PAT. OFF.
GREASE

One Ton or a Shovelful?

ONE man can raise a ton with the Godfrey Conveyor and not exert a fraction of the energy required to lift a shovelful of coal.

One man can unload and store a carload of coal in an hour and a half with the Godfrey Conveyor at an average power and labor cost of from five to seven cents a ton.

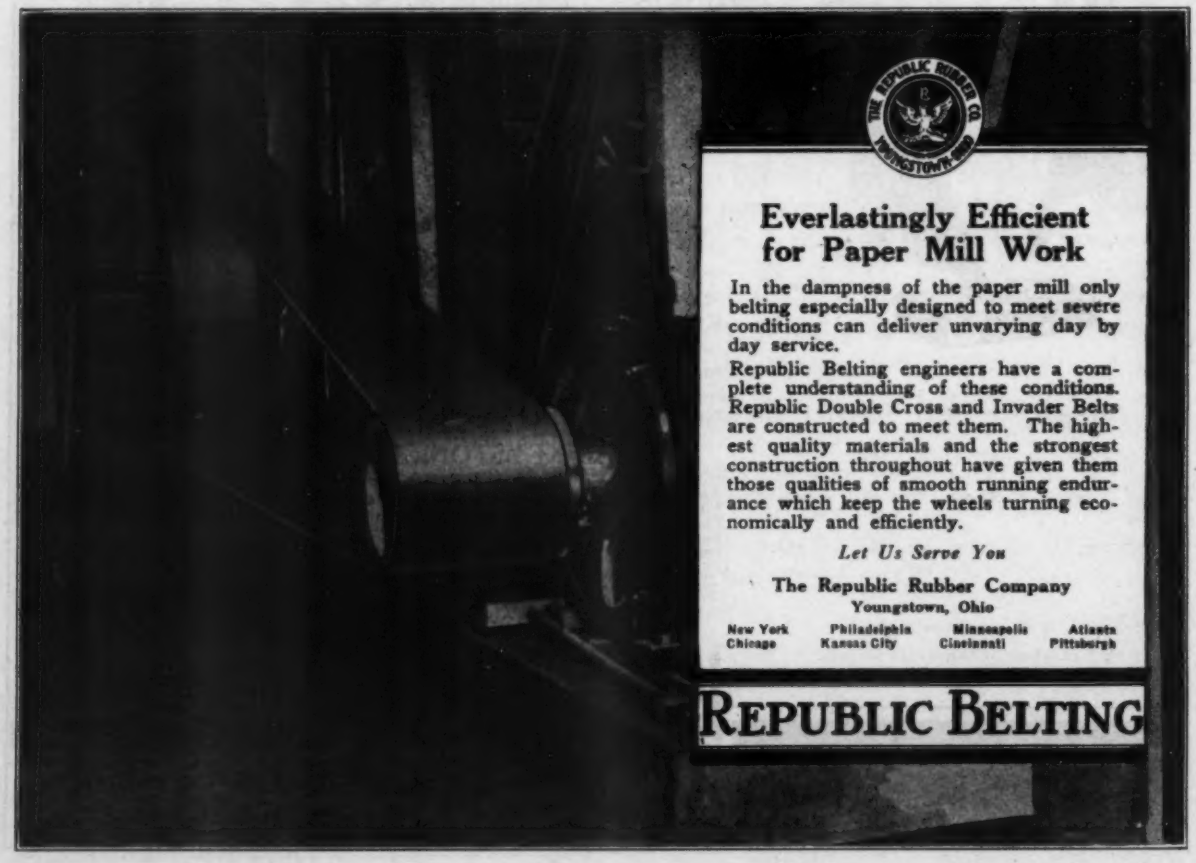
The Godfrey System eliminates demurrage and enables you to secure larger allotments of coal during periods of industrial stress. It frees you from labor difficulties and makes you economically independent.

When you realize that you can install a Godfrey Conveyor at no greater cost than the price of a good truck, you will want to know more about this equipment.

Ask for Catalogue A-1

Godfrey Conveyor Company

ELKHART, INDIANA, U. S. A.



Everlastingly Efficient for Paper Mill Work

In the dampness of the paper mill only belting especially designed to meet severe conditions can deliver unvarying day by day service.

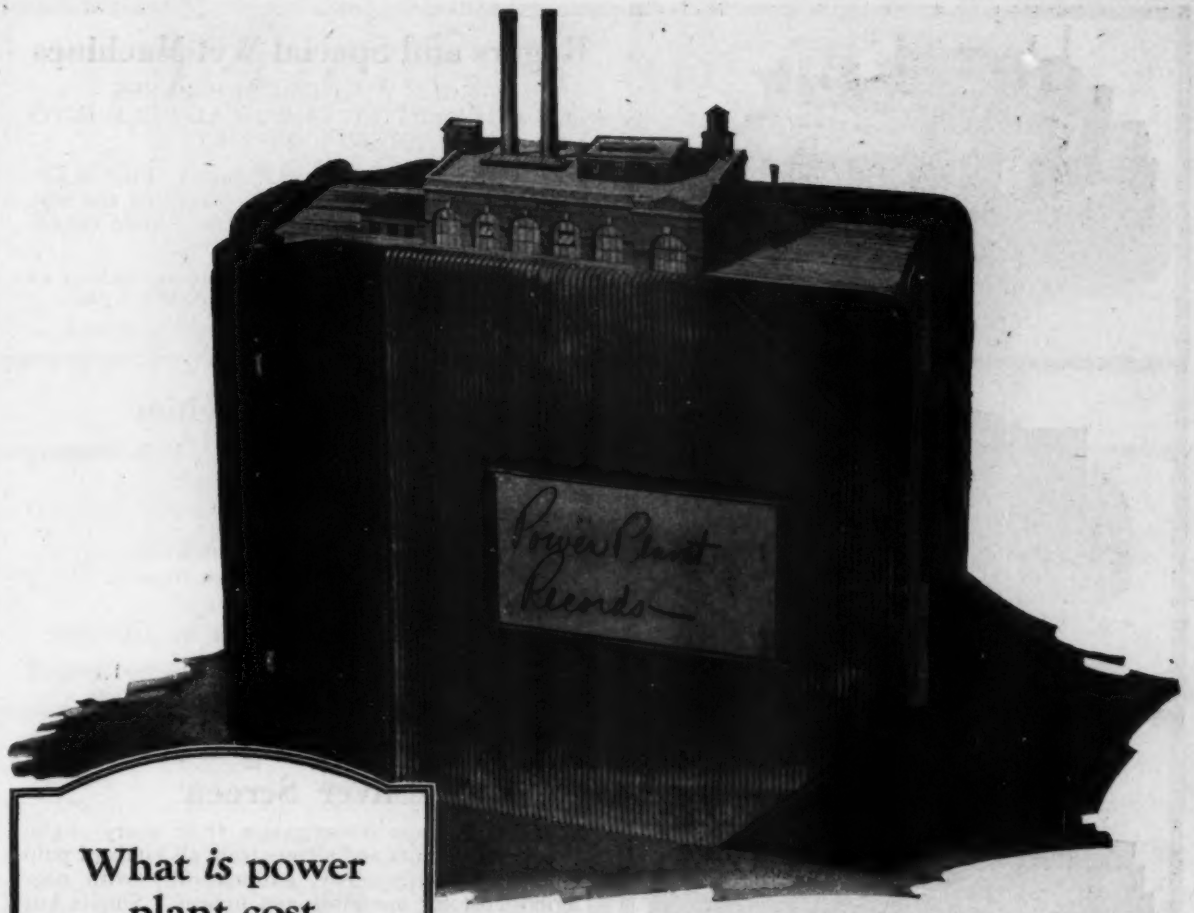
Republic Belting engineers have a complete understanding of these conditions. Republic Double Cross and Invader Belts are constructed to meet them. The highest quality materials and the strongest construction throughout have given them those qualities of smooth running endurance which keep the wheels turning economically and efficiently.

Let Us Serve You

The Republic Rubber Company
Youngstown, Ohio

New York Philadelphia Minneapolis Atlanta
Chicago Kansas City Cincinnati Pittsburgh

REPUBLIC BELTING



What *is* power plant cost accounting?

THERE is nothing involved about power plant cost accounting. It is merely a sensible, systematic setting down of important data on simple forms. These forms, used in connection with the readings of flow meters and other easily acquired data, cover every phase of steam generation and distribution. The extent of the system depends upon the size of the plant. It is profitable in plants of all sizes. This is fully told in Bulletin 14.

Branch Offices

New York, Philadelphia, Boston, Pittsburgh, Birmingham, Detroit, Denver, Kansas City, Dallas

Dominion Flow Meters Co., Toronto, Canada
Herbert Greene & Co., Ltd., London, England

Your plant within the covers of a book—

WHERE can you look for an accurate record of the cost of generating steam—the cost of producing power and the steam consumption of different departments?

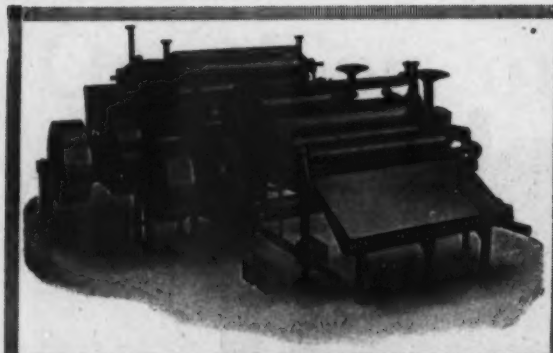
Test runs, manufacturers' claims, and theoretical efficiencies are but a vague guide. Accurate knowledge—facts that will enable you to steadily cut power costs—must be based on *continuous* records—records that are supplied essentially by Republic Flow Meters and put into tangible, easily understood form by the system of power plant cost accounting that has been developed by prominent accountants working in collaboration with Republic engineers.

Continuous records summarized on specially prepared forms put every detail of steam production and consumption within the pages of a book. These records will enable you to (1) accurately apportion steam charges (2) check, and therefore improve, the efficiency of your equipment, and, as a result, (3) lower manufacturing costs.

Bulletin 14, "Power Plant Cost Accounting," shows how power plant records form a link between the power plant and the main office. Bulletin 12, "The Measurement of Steam," describes the breadth of application of *the only electrically operated flow meter.*

Republic Flow Meters Company, 2220 Diversey Parkway, CHICAGO

ONLY ELECTRICALLY OPERATED
REPUBLIC
FLOW METERS



Rogers and Special Wet Machines

SINGLE AND DOUBLE PRESS
FOR CONVERTING CHEMICAL PULP INTO SHEETS 48% DRY

25-30 TONS air-dry pulp per 24 hours. Built in 72" width only, with patented pulp weakening and separating device or our new automatic knife cut-off attachment.

FREIGHT CHARGES are greatly reduced. Savings on this item alone often pays for the machine in one year.

All infringements will be vigorously prosecuted

The Wood's Machine

Used as Pulp Thickeners, Savealls, Pulp Washers and Water Filters

ADVANTAGES:

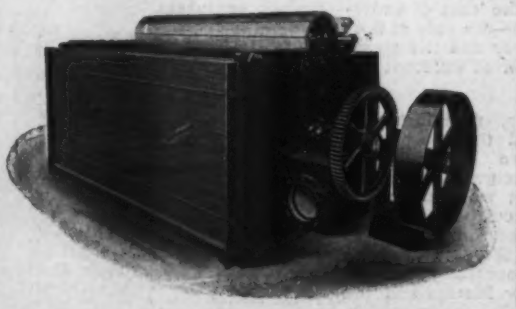
Reduced Wire Costs	No Couch Roll
Enormous Capacity	Minimum Repairs
Only 2 H. P. Required	No Doctor
Works Automatically	Requires No Attention

OVER 100 MACHINES SOLD AND IN USE

Wells Undulating Knot and Sliver Screen

Will bear closest investigation from every angle. It separates knots and slivers from all kinds of pulp efficiently, continuously, automatically with negligible cost for operation and upkeep. Simple but rigid construction. Only best materials used. Operation in plain view.

60 TONS DAILY CAPACITY, STANDARD SIZE. WRITE FOR BLUEPRINT AND FURTHER INFORMATION



Improved Decker

Single or Double Cylinder Type

Built in the following sizes:

Cylinder mould diameter, 36" or 40".

Face of cylinder mould, 72", 84" or 96".

Cylinder mould of best reinforced construction and properly supported with our latest design outside bearings.

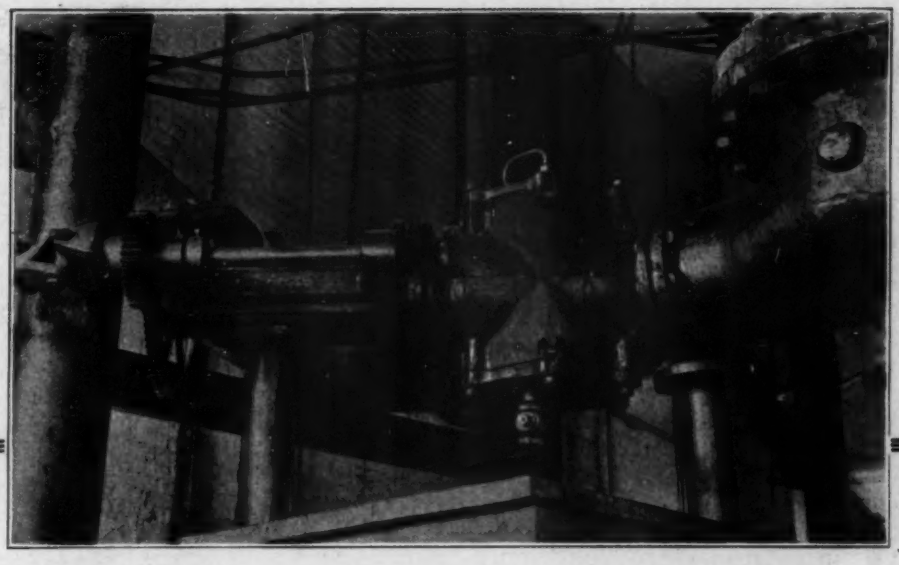
Vat furnished either all wood or with cast-iron ends.

For Stability and Efficiency our Improved Deckers are Unexcelled

PULP AND PAPER MILL MACHINERY

GLENS FALLS MACHINE WORKS

GLENS FALLS, NEW YORK



The HORKMAN

improved

SAFETY

blow-off valve (pat.)

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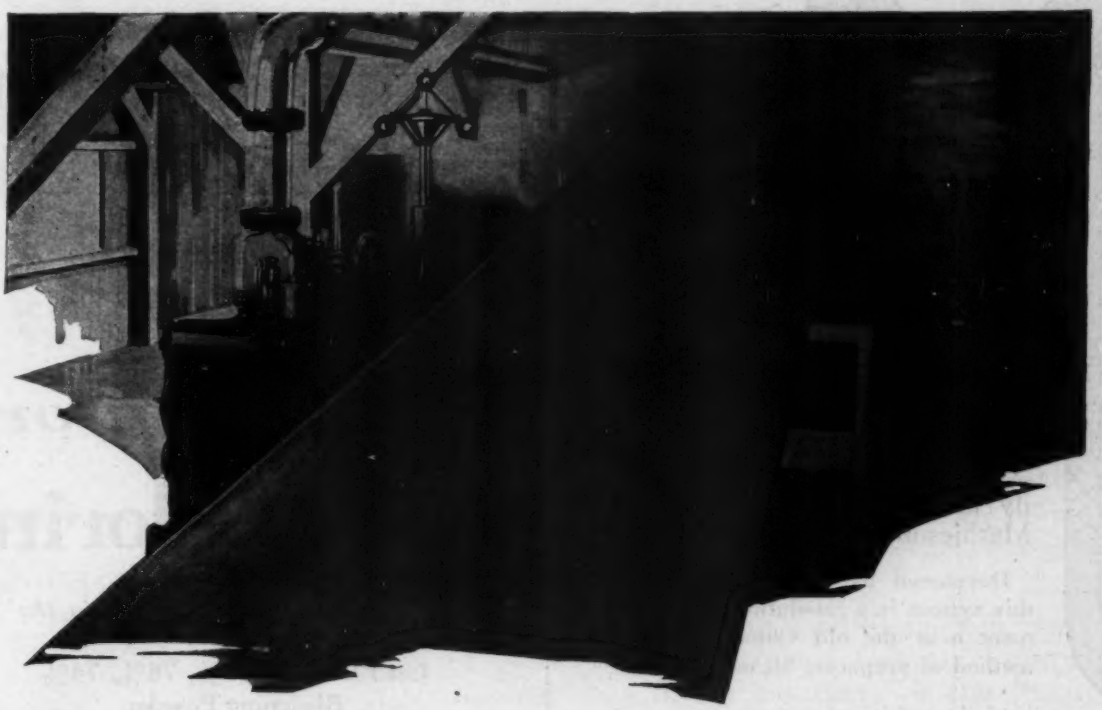

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This gigantic installation of "Commander" Belting is another tribute to Goodrich efficiency in belt manufacture.

It is a 56 in. 8-ply belt, 103 feet 7 in. long and transmits practically all the power in this big, modern installation.

After a thorough investigation of all makes, "Commander's" stamina for heavy loads and sudden impacts, flexibility for high speeds, waterproof quality and long life easily made it first choice.

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Developed by Mathieson engineers, this system is a revolutionary improvement over the old Chloride of Lime method of preparing bleach liquors.

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Solutions uniform in strength and of any desired concentration.

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The illustration represents an ideal plant for carrying out this system. The one-ton Chlorine containers are unloaded from our Multiple Unit Tank Car by a crane and transferred on an industrial truck to the storage floor. The containers, as required, are connected to the supply pipes leading to the mixing tanks; the Lime is conveyed by means of an industrial truck. These tanks are equipped with the usual pumps, expansion coils, valves, etc., and the liquor, when settled, can be transferred to the stock tanks by the circulating pumps.

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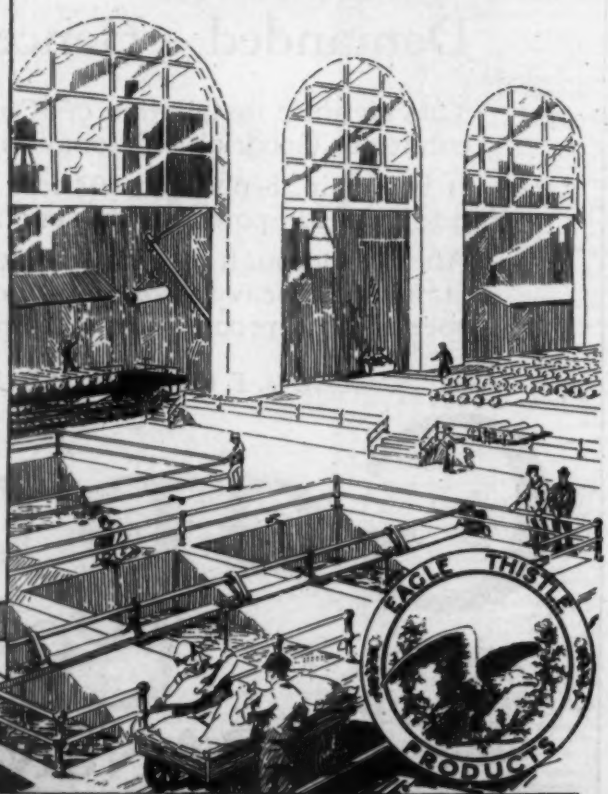

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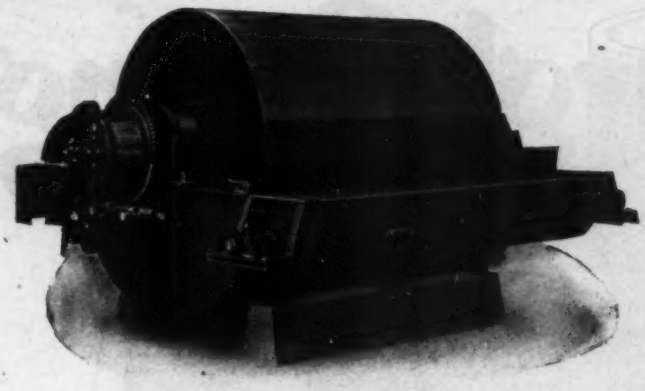

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Oliver Filters are supplanting other systems for washing Soda or Kraft pulp because they wash more efficiently and effect important economies which quickly pay the cost of Oliver installation.

Pulp is washed in a thin sheet, instead of in a mass several feet thick, thus insuring direct contact of the wash water with every particle of fibre. A thorough and uniform displacement of cook liquid is secured, automatically insuring a non-variable output at a uniform rate.

The following economies soon pay the entire cost of an installation of Olivers:

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2. **Soda losses decreased 75%.**
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4. **Floor space reduced 75%.**
5. **Pulp washed with 1/3 less hot water.**
6. **Black liquor returned to evaporators with 1/3 less dilution.**
7. **Amount of pulp in process greatly reduced.**
8. **Time of pulp in process is enormously decreased.**

Installation costs for Oliver Filters are lower than for either diffusers or pan stations. A filter with 100 square feet of cloth area handles 25 to 30 tons in 24 hours.

Our extensive experience is at your disposal without obligation. Let us help you reduce your wash room costs.

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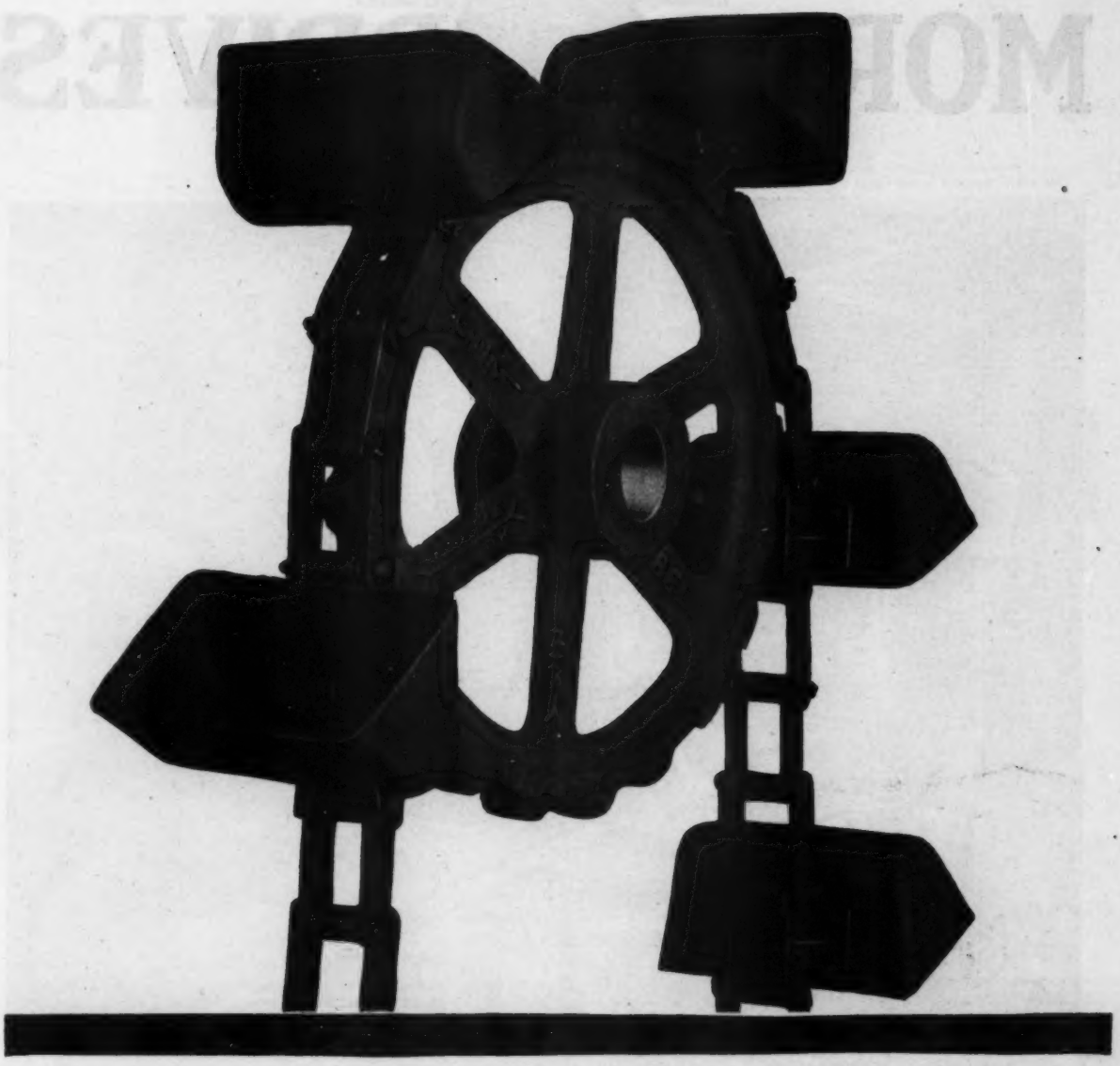

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They fit each other snugly. There is no sliding or slipping as the links seat themselves against the teeth, and they continue to fit each other snugly, because the flint hard surfaces prevent wear.

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THE MORSE "ROCKER JOINT"

Positive as Gears — Flexible as a Belt

Longer Life

Fifteen Morse Silent Chain Drives in Congoleum Company Mill

The illustration shows one of the fifteen Morse Silent Chain Drives in the mill of the Congoleum Company, Asbestos, Maryland, driving a Jordan engine from a 150 H.P. motor on felt stock, one of the hardest kinds of stock to refine.

This mill uses the following Morse Chain Drives:—one 150 H.P.; four 100 H.P.; nine 90 H.P.; one 75 H.P.; all doing splendid work.

Morse Chains are 99% efficient, silent, durable and economical to maintain.

Where you have unusual and hard conditions from wear and exposure, Morse Silent Chains prove their greatest worth.

For driving Jordan engines, beating engines, paper machine line shafts, and for many other places in the paper mill, the ideal drive is the Morse Silent Chain.

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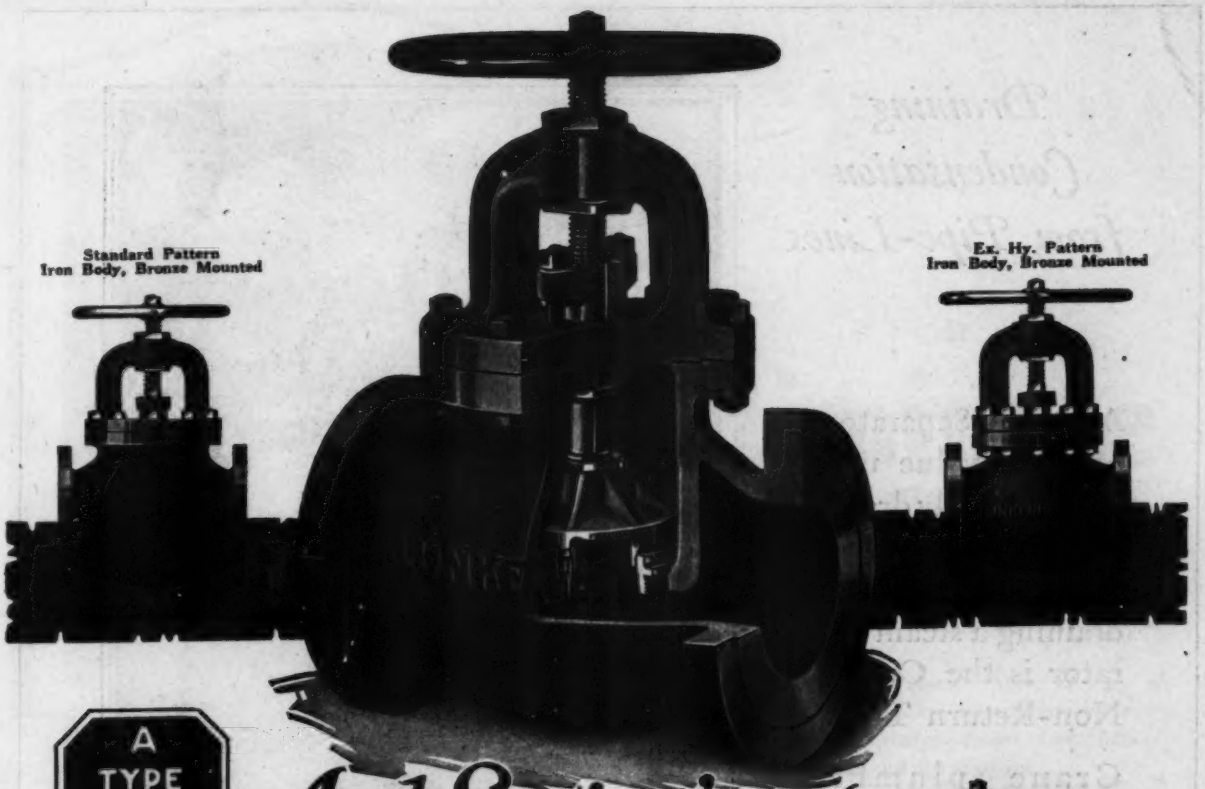

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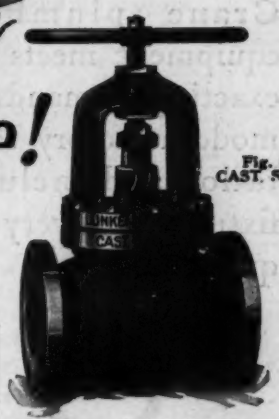

Fig. 606
CAST STEEL

Be it a small or large size for low or high pressures and temperatures, there is a Lunkenheimer Valve especially suited to the purpose. Every type is designed to give maximum service under extreme operating conditions, and with the line complete, standardization throughout the plant, with its many advantages, is easily accomplished.

With seating surfaces regrindable and all parts made to gauge and renewable, the installation of Lunkenheimer Valves means permanence in the line with a minimum expense for maintenance and repairs.

Our catalog No. 58-FG illustrates and describes the various types in detail. A copy will be sent on request. If you have a valve problem, we will help you,—no obligation.

Fig. 73
"RENEWO"

Fig. 1021
"FERRENEWO"

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LARGEST MANUFACTURERS OF HIGH GRADE ENGINEERING SPECIALTIES IN THE WORLD
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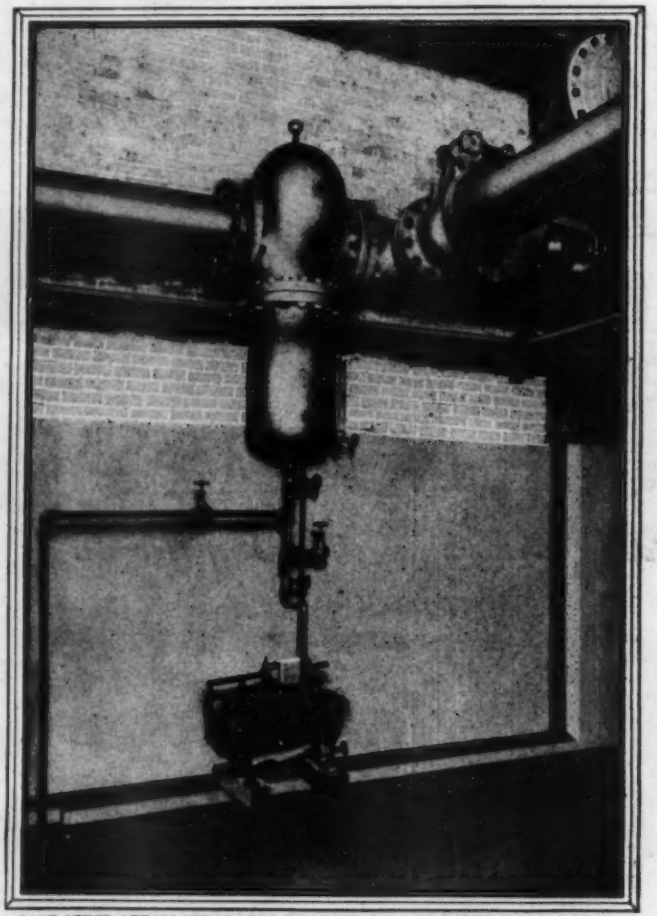
Crane plumbing equipment meets the exacting demands of modern factory sanitation and includes fixtures for every requirement.



CAST STEEL STEAM SEPARATOR DRAINED BY A CRANETILT NON-RETURN TRAP. THIS SEPARATOR IS IN HIGH PRESSURE STEAM MAIN TO MAIN TURBINE AT THE CENTRAL PAPER CO., MUSKEGON, MICH. C. W. SMITH, MECHANICAL ENGINEER

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Terry Turbine and Gears driving Condenser Removal Pump. If this unit should shut down, the main unit would have to be stopped long enough to permit the condenser shell to cool before condensing operation could again be resumed.

Eliminate Shut-Downs

Terry Turbines receive their energy directly from the boiler, avoiding the cycle of main unit, generator, fuses, switchboard and wiring required by motors.

When selecting the drive for power plant auxiliaries the significance of the above statement should be borne in mind. What more direct method of eliminating shut-downs could be devised than to eliminate the external sources of shut-down. Then dependability of service would rest only with the driving apparatus itself.

The single stage steam turbine is the most simple prime mover. It cannot be injured from overload, making it unnecessary to provide an inefficient over-size unit. Its fuel consumption per horsepower is less than one-quarter that of the most efficient condensing turbine. It is, in short, the ideal drive for auxiliaries.

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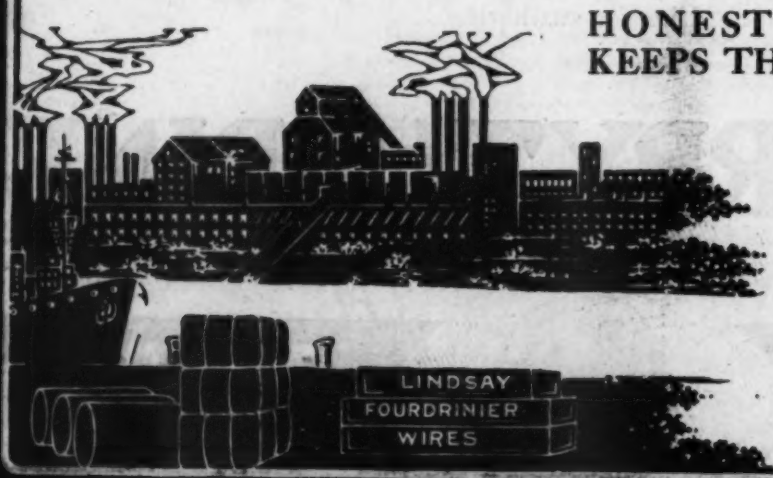

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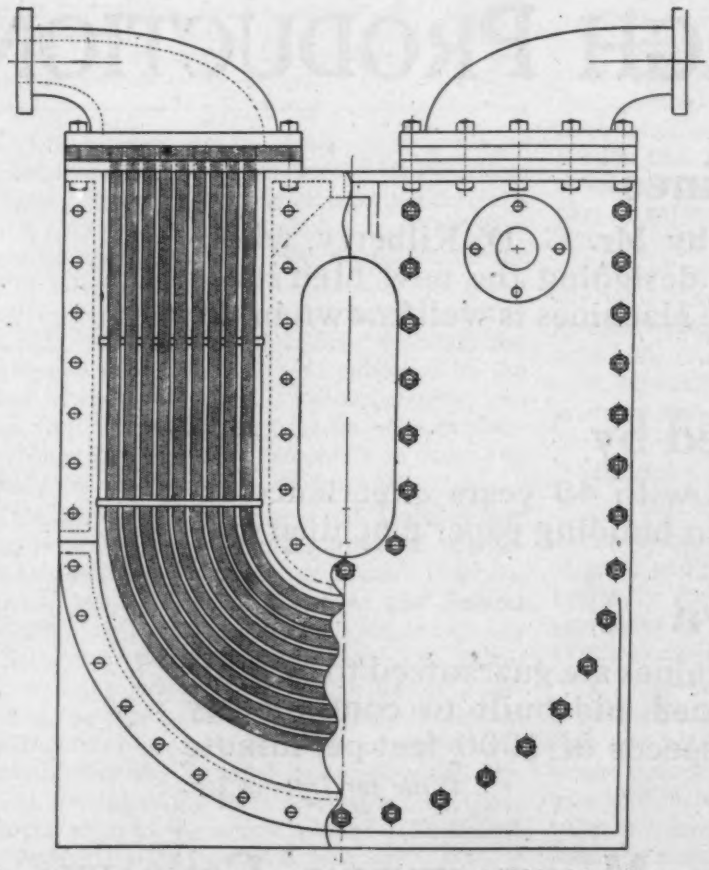
The Wolf Relief Cooler when installed is compact, occupying a minimum amount of floor space. Yet for all its compactness it results in a more efficient recovery of waste gases from the digester and, with no additional expense, supplies hot water for the washing of the pulp in the blow-pits.

Specifications submitted upon request.



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IMPROVED No. 5 RYTHER SHREDDER for the primary reduction of dry, partly dry and partly frozen ground wood and chemical fibre laps, sheets and boards.

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Paper Machines

Designed by Mr. G. D. Kilberry, whose success in designing the new high speed Laurentide Machines is well known in the paper field.

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A concern with 40 years' experience exclusively in building paper machinery.

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Paper machines are guaranteed to be properly designed and built to continuously maintain speeds of 1000 feet per minute or more. *Write for Information.*

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Safety Code for Paper and Pulp Mills

Prepared by the National Safety Council Sectional Committee of the Paper and Pulp Safety Code

The only states that have any rules and regulations for the enforcement of Safety in paper and pulp mills are Wisconsin and Washington. Even such state orders are very brief and do not nearly cover the field of Safety as applied to paper and pulp mills as thoroughly as the committee has done in this code. As members of the committee, there are members of three state boards whose function is to enforce labor legislation and safety orders, so that the code when completed will have the approval of at least these three men, and naturally the departments and states they represent.

The Sectional Committee feels that certain sections in this code are not complete. The departments on which much further information is needed are those of rag and old paper preparation, sulphate process, and qualifications and duties of employees. The readers of The Paper Industry are invited to contribute freely their thoughts on these subjects.—EDITOR.

SEVERAL years ago, the American Engineering Standards Committee assigned to the National Safety Council the sponsorship for the formulation of a safety code for paper and pulp mills. This assignment was given the Council because of the Council's interest in safety, and because the members of the Paper and Pulp Section are interested in such a code. At that time, a Safe Practices Pamphlet on paper and pulp mills had been published by the members of the section, and a second pamphlet was planned. In view of the plans for the code, publication of other Safe Practices Pamphlets on paper and pulp mills was not carried out as projected.

The Section Committee for this code includes four men connected with paper manufacturers or an association thereof, three connected with state labor departments, two with departments of the Federal Government, two with insurance companies, one manufacturer of paper mill machinery, one representative of the American Society of Safety Engineers, and one representative of the Ohio Society of Safety Engineers. Some of these representatives are also members of the National Safety Council. Mr. Robert M. Altman of the Marathon Paper Mills Company is chairman of the committee and J. M. Sandel of the National Safety Council is secretary.

One meeting of the committee was held during the 1922 Congress of the National Safety Council at Detroit. The first draft of the code was there discussed after an opportunity had been given for review by members of the committee, and suggestions and changes in the code were made. The second draft, which is herewith presented for your review, contains all of the suggestions and changes that were given the committee during their meeting at Detroit and later. In presenting this draft to the readers of "The Paper Industry," the committee hopes to receive the benefit of any criticism and comments that can be made. These will be welcome and given prompt attention by the secretary of the committee.

It is a desire of the committee to prepare a code which is workable and practical. Various codes, some completed and others in the process of formulation, which are applicable to the paper and pulp industry, are listed in paragraph twelve of the draft. Only the necessary reference is made in the different parts of this code to those codes; it being the intention to prepare for paper and pulp mill men an operating code.

You may be sure that the committee will appreciate your assistance, and will welcome anything that you can send. Much of the code is complete; part nine, qualifications and duties of workers, being a portion that has not been well developed yet. The committee have not overlooked the importance of this part of safety work in paper and pulp mills, but in order to build well, we need the assistance of a large number of persons so as to have plenty of material. We hope that there will be a hearty response by everyone interested in the operation of paper and pulp mills to our request to criticisms of the entire code, especially the information necessary to formulate part nine.

Safety Code for Paper and Pulp Mills

SECTION 1. SCOPE AND PURPOSE

10. **Scope.** This code applies to operating hazards of paper and pulp mills. It does not include requirements for guards for belts, pulleys, gears, etc., nor provisions for consideration of any subject covered in other codes, either completed or under way.

11. **Interpretations and Exceptions.** The purpose of this code is to provide reasonable safety for life, limb and health. It shall be liberally construed to secure these results, by the enforcing officers or body, who shall have authority in cases of practical difficulty or unnecessary hardship, to grant exceptions from the literal requirements of this code, as long as equivalent protection is thereby secured. Where specific devices or methods are mentioned in this code, other devices or methods which will secure equally good results may be used, subject to the approval of the enforcing officer or body.

12. **Reference to Other Codes.** Several of the kinds of equipment and conditions found in other industries as well as in paper and pulp mills are covered by other general codes which have been or are

being formulated under the procedure of the American Engineering Standards Committee. These codes should be referred to for information on their respective subjects; for copies address the American Engineering Standards Committee, 29 West 39th Street, New York. The subjects thus covered include:

Steam Boilers.
Conveyors.
Compressed Air Machinery and Equipment.
Electricity (Fire Code).
Electricity (Safety Code).
Electric Power Control.
Floor Openings, Railings, Toeboards.
Grinding Wheels.
Head and Eye Protection (Goggles, etc.).
Ladders.
Lighting.
Lightning.
Logging and Sawmill.
Power Transmission (including belts, gears, shafting, etc.).
Sanitation.
Ventilation.
Woodworking Machinery and Equipment.

13. **Mandatory and Advisory.** The word "shall" is to be understood as mandatory and the word "should" as advisory.

Part I—The Yard

SECTION 10. UNLOADING AND STORAGE OF PULP WOOD

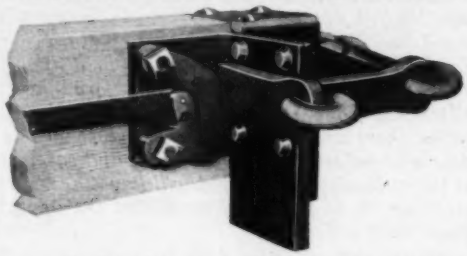
100. **Chains for Locomotive Cranes and Jammers.** Chains used on locomotive cranes or on jammers shall be periodically inspected. Cables and ropes shall also be daily inspected, and inspection tags showing date of inspection should be attached to all tackle when it is placed in the store room.

101. **Unloading Pulpwood.** Wherever locomotive cranes are used for either loading or unloading, the pulp wood should be piled at a distance from the center of the track far enough to allow a clearance of 18 inches between the pile and the end of the cab of the largest locomotive crane in use when the cab is turned at right angles to the track. Such distance should be borne in mind when unloading from box cars, care being taken to pile at a sufficient distance from the center of the track to have the safe clearance when a locomotive crane is used. If no locomotive cranes are used, the minimum distance of pile from center line of track should be 8½ feet.

102. **Anchorage for Jammers.** The anchorage of jammers shall be frequently inspected, whether the jammers be located on cars or on the ground.

103. **Flat Cars.** Whenever possible, flat cars for the conveyance of pulp wood should be equipped with safety stake pockets except when unloading by crane and grab buckets. When this has not been done the cutting of wires and chopping of stakes should be done only by experienced and agile employees. The stakes should first be partially cut through and then the wires should be cut, and the employee should be cautioned not to work directly in front of the load. Wire cutters equipped with long handles are recommended.

104. **Orderly Piling.** The piling of pulp wood at



Safety car stake pocket (Patented). When rod A, leading to opposite side of car, is withdrawn, dogs B and C are released and plate D slips off tapered pin E, releasing the two sides of pocket F and G

time of unloading shall be done in such a manner that there will be no logs protruding irregularly over a walkway. Walkways should always be in good condition and should be clear of wires, which should always be removed immediately after unloading. Holes near tracks shall be filled in.

105. **Warning Signs and Signals.** Workmen in yards shall be warned of the approach of locomotives in cases where logs are piled high around a curve. An automatically operated electric gong may be used as a necessary warning; if this is not provided a whistling post should be erected.

106. **Gang Plank Construction.** Gang planks, for use in unloading pulp wood from box cars, should be of sound construction, as wide as car door and fastened to the car door track or bottom car door fittings.

107. **Hand Tools.** Pickaroons, peavies, and hand hooks should be kept sharp so as to prevent wood from slipping and only experienced men should handle such tools. Inexperienced men shall be carefully instructed by their foremen.

108. **Hand Protection.** Men handling rough material in the yards should use hand protection against slivers. This should preferably be heavy leather gloves, but hand leathers may suffice.

109. **Yard Housekeeping.** All parts of the yard should be free of loose material. Refuse should be periodically removed and disposed of. Material other than mentioned above should be piled in such a way that there will be a minimum possibility of injury to any employees.

Note 1—Rules and recommendations for railroad operation in yards can be found in the recommendations of the American Railway Association in their publications.

Note 2—Rules and recommendations for the

operations in connection with river driving and the hot pond may be found in section 17 and rule 211 of the Logging and Sawmill Code.

SECTION 11. BLOCK PILE

110. **Arrangement of Block Piles.** If the storage yards for the pulp wood are congested, block piles should be safeguarded by orderly piling of the wood at the bottom, so that the proper clearance will be maintained, and the pile will always be within control.

111. **Removing Pulpwood.** To remove pulpwood from the block pile when frozen, the use of an endless wire rope and ship's anchor in connection with a drum is recommended. Employees can thus keep in the clear and the pile can be very quickly loosened.

112. **Block Pile Storage.** If it is desirable to store pulp wood in the form of blocks, the blocks should be piled after the wood is barked.

113. **Sprayers.** Sprayers should be installed in block piles, as a means of prevention of decay, and to reduce the fire hazard during the summertime.

SECTION 12. UNLOADING AND STORAGE OF RAW MATERIALS

120. **Protection for Employees.** Respirators, goggles, or protective masks should be used wherever possible in unloading alum, clay, soda ash, lime, bleach powder, sulphur, caustic soda, etc. See Head and Eye Protection Code. When unloading acid, workmen should be provided with goggles, rubber gloves and rubber aprons. Respirators, goggles, protective masks, and rubber gloves that have been used shall be cleaned and disinfected before being used by another employee. When unloading raw materials onto platform, steel plates have been found efficient when equipped with accessories to prevent plates from slipping. Perforated plates have been very successfully used for this purpose.

121. **Handling Empty Carboys.** In order to prevent acid burns by men handling supposedly empty carboys, the carboys shall be entirely drained before being loaded for return. Many men have been badly burned by handling carboys which they had every reason to suppose were empty, and yet had a little acid remaining in them.

122. **Piling Pulp.** Piles of pulp shall converge toward the top, or "stepped back," especially when stored indoors. Pulp laps shall be interlapped to make the pile secure, and temporary wooden braces between piles shall not be used. When piles are high, no pulp shall be placed on pipe lines near the ceiling. When delivering from pile, the general shape of the pile shall not be changed, and delivery shall be made from the top layers first.

123. **Trucks.** Trucks with rollways should be used in handling paper in rolls or full reels. Trucks having four wheels should be equipped with spring clips for holding the handles in an upright position when not used, or the handles should be counterweighted so that they will stand upright, to avoid a tripping hazard. When two wheel trucks are used, they should be equipped with safety brakes.

124. When piling materials inside buildings and on platforms, there shall be a sufficient clearance allowed for the safe operation of electric trucks of all types.

Part II—Preparing Pulpwood

SECTION 20 SAWS

200. **Screens for gang and slasher saws.** A heavy movable screen high enough to give adequate protection should be hung in front of the saw carriage or traveling table to protect the saw operator from flying blocks and particles and offer a barrier in case of saw breaking. A similarly constructed screen should be used for the slasher saws. See also Logging & Saw Mill Code.

201. **Slasher Tables.** Slasher tables should be elevated three or four feet above the floor so that employees would not stumble and fall upon the saw table. If not high provide a standard rail guard at side. Complete enclosure of the slasher drives is necessary to protect the oiler and to prevent bolts being thrown into the drive. Employees should be prohibited from jumping on the slasher table. The runway to jack ladder should be guarded so men will not jump off the platform.

202. **Guards Under Table.** The under side of the saws should be enclosed with sheet metal, attached so as to provide liberal clearance for the escape of saw dust.

203. **Oiling.** All oiling should be done at stated periods—at a time when all machinery is stopped.

See also Power Transmission Code.

SECTION 22. HAND BARKERS

220. **Guards for Hand Barkers.** The operation of hand barkers should be safeguarded by the use of a lever attached to the top of the machine and extending down so as to hold the wood block against the revolving disc. A gear wheel to facilitate the revolving of the wood block will further safeguard the operator's hands. In addition, the installation of a sheet metal guard on the side toward which the disc revolves will prevent persons passing from being struck by flying particles, etc.

Note to Committee: The above rule would be satisfactory where a round block is used, but is not entirely satisfactory or applicable to split wood. Should there be another rule to take care of split wood, or should the above rule be changed?

221. **Barker Knives.** Sharp knives, and knives free from nicks shall be used on hand barkers.

222. **Barker Disc.** The revolving disc shall be kept in such condition that it will be uniformly revolving in true. The disc shall be periodically inspected and removed from service when cracks develop.

See also Power Transmission Code.

SECTION 23. BARKING DRUMS

230. **Chain Drives.** When barking drums are driven by chains, the chains shall be frequently inspected for any defects.

See also Power Transmission Code.

SECTION 24. SPLITTERS

240. **Splitter Block.** The block which the wood is rested upon, whether on the vertical or horizontal splitter, should have a corrugated surface so that the wood will not slip.

241. **Hand Protection.** Employees handling blocks shall be instructed to wear heavy leather gloves or hand leathers.

See also Power Transmission Code.

SECTION 25. CHIPPERS

250. **Chipper Knives.** Chipper knives should be kept sharp at all times to prevent splitting of chips, which occurs when wood is frozen. The chipper spout should be long and form an acute angle with the chipper, and the end of it should be protected by either a circular piece of heavy belting fastened over the mouth of the spout or short pieces of chain hanging between spout and operator, to retard any block from flying back from the knives.

251. **Chipper Disc.** The revolving disc shall be kept in such condition that it will be uniformly revolving in true. The disc should be periodically inspected and removed from service when cracks develop.

See also Power Transmission Code.

Part III—Rag and Old Paper Preparation

SECTION 30. SORTING ROOM

300. **Disinfection.** Whenever possible, all rags and old paper should be disinfected before handling by employees.

301. **Ripping Knives.** Knives for ripping pockets and removing buttons shall have the pointed end cut off so as to be blunt. It may be located at any convenient place on the table.

SECTION 31. SHREDDER AND DUSTING MACHINERY

310. **Shredders.** The feed of shredders should be guarded by the installation of a smooth roll running idle in front of the toothed roll. A sheet metal hood should enclose both of these rolls.

311. **Dusters.** If employees use pitchforks for feeding the dusters, they should be cautioned in working with them so that they will not stick one another. For that reason, it is better not to have two men feeding the same machine.

312. **Blowers.** Where blowers are used to transport rags, there should be a long, large-sized hopper attached to the blower for feeding the rags to the blower. This is to prevent hands from being drawn into the blower blades.

313. **Dust Collecting System.** A dust collecting system should be installed to improve the working conditions and protect the health of employees working in this department.

Part IV—Acid Making

SECTION 40. SULPHUR BURNING.

400. **Sulphur Burners.** The location of sulphur burners should be ventilated. This will be determined by the individual location. Where burners are located below the ground level, it is necessary to provide proper circulation by means of ventilating fans. See also Ventilation Code.

SECTION 41. ACID TOWERS

410. **Protection for Employees.** Employees required to open the tower lid prior to filling should wear suitable gas masks. Where lime slacking takes place, employees shall be provided with whole rubber boots and gloves, and sufficient acetic acid or other suitable reagent shall be provided to counteract any lime burns. See also Head and Eye Protection Code.

411. **Elevator Inspection.** Elevators for acid towers should be inspected periodically.

412. **Handling Stone.** Stone should be loaded in trucks when hoisting to the top of the acid tower. Loose stone is less liable to fall and cause injuries if handled in that way.

413. **Signal System.** A signal system should be provided between the acid towers and the acid plant, for use in case men are suddenly overcome with gas while at work. This signal should preferably be arranged so that a bell will ring in the acid plant, and will call a properly equipped rescue party.

SECTION 42. DISTRIBUTING LINES, VALVES, STORAGE TANKS, ETC.

420. **Hoops for Acid Storage Tanks.** The iron hoops of acid storage tanks should be frequently inspected to ascertain the extent of corrosion, and the hoops should be renewed when necessary. The hoops of tanks shall be round.

421. **Repairing Tanks.** Men working at the repair of acid tanks should be properly safeguarded. This is especially necessary if the work is done on the inside of the tank, and above the acid level. The inspection of tanks should be safeguarded in the same way.

422. **Lead Poisoning.** The repair of lead lined tanks should be conducted so that there will be plenty of ventilation, and no accumulation of lead fumes.

Part V—Chemical Processes of Making Pulp

SECTION 50. SULPHITE PROCESS

500. **Chip Bins.** Openings leading to digesters shall be locked in a closed position while men are working in chip bins, and the key to such lock should be in the possession of men in the bins. These men shall be provided with life belts for aid in case of settling of chips. The means of access and escape shall be provided for the bins, and there should be facilities for breaking up or the preventing arching of chips.

501. **Ventilation.** Proper ventilation and accessi-

bility are essential to safety in the sulphite process, because sulphurous acid gas is injurious to the respiratory system, and if the gas is inhaled in any quantity it may cause permanent impairment to the functions of the throat, lungs, and digestive organs.

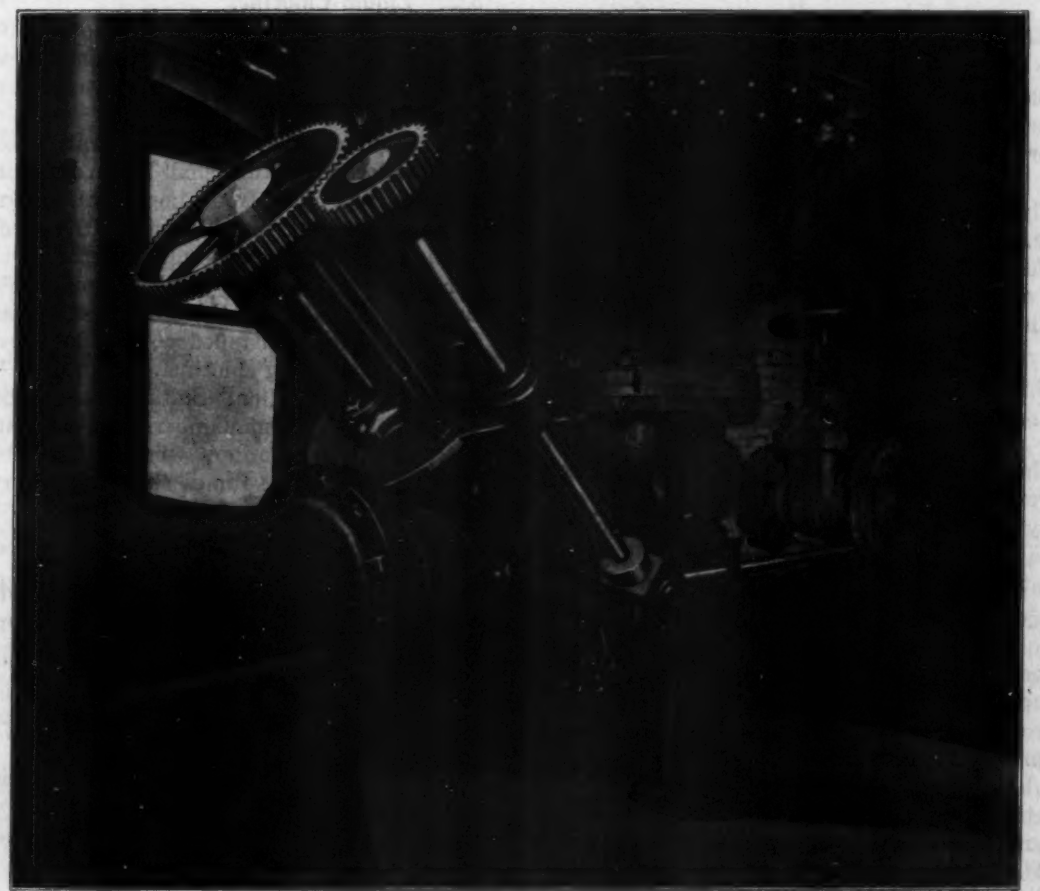
502. **Exits.** At least two unobstructed exits at opposite ends of the room should be provided in digester rooms as the gas will often accumulate near the exits, especially if there is a draft. In case there is but one entrance or exit to the filling floor of the digester room, there should be a fire escape installed at the end furthest from the inside stairway to allow escape from either gas or smoke. Individual gas masks which have been found to give protection against sulphurous acid gas shall be provided for employees of the digester room. See also Building Exits Code.

503. **Blow-off Valves and Piping.** The blow-off valves of the digester shall be arranged so as to be operated from outside the digester room. The valve should be opened slowly to allow for expansion. Through bolts instead of cap bolts should be used on all digester piping. Bronze pipe between the valve and blow pit is much safer than cast iron pipe. Quarter-inch drain test holes should be drilled to a depth one-fifth of the thickness of the pipe, so that when the pipe wears warning will be given.

504. **Digester Linings.** Digester linings shall be periodically examined by a competent inspector. Fresh air shall always be blown into the digester constantly while workmen are inside, and chain ladders made of long links of steel should be used in preference to rope ladders. Valves controlling lines leading into the digester shall be locked in the closed

Courtesy Northern Paper Mills

Valve rod extending through wall



Remote control for digester blow-off valve Courtesy Northern Paper Mills

position, and the keys to the locks be in the possession of the person inspecting the digester. The inspector should never enter the digester unless a life line is securely fastened to his body and at least one other experienced employee standing outside of the digester to give him assistance.

505. **Lead Poisoning.** The repair of digesters should be conducted so that there will be plenty of ventilation, and thereby prevent an accumulation of lead fumes.

506. **Blow Pits.** Blow pits should be safeguarded in the following ways:

a. Construct the pit openings small with raised sides so that a man can sit outside of the openings; or

b. Install a low railing so located that the operator may sit on the side of the opening with feet inside of the pit, railing to be the height of the average man's chest; or

c. Construct a railing with a swinging arm which has a locking device.

d. Openings should preferably be on the side of the pit instead of the top.

e. A specially constructed ladder should be used for access to blowpits, to be constructed so that the door of the blow pit cannot be closed when the ladder is in place.

SECTION 51. SULPHATE PROCESS

507. **Operating Rules when Blowing-off Digesters.** When blowing off digesters (this applies equally well to the sulphite process), the following rules should be observed:

a. Man operating digester valves should personally see that no one is present in the digester house, and that no one is in the blow pit. He should close and lock the blow pit doors, and then open his valve, after warning by word of mouth.

b. After blowing, the workmen operating the valve should unlock and open the blow pit door.

510. **Hazards.** The hazards of the sulphate process are similar to the sulphite process, the exception being that caustic soda is used instead of acid. The preventive measures for the sulphate process are very much the same as with the sulphite process, and the exception is that a copious supply of running water is a satisfactory re-agent for caustic soda burns.

511. **Blow-Lines.** Each digester should have two independent "gas off" lines so that if one of them plugs up with pulp, the other may be used and the hazard of unplugging the lines with the digester under pressure is overcome. A steam reducing valve should be placed in the high pressure steam line so that if the boiler pressure should be raised above the maximum allowable working pressure of the digester, it would be impossible for the digester to be strained beyond its maximum limit.

512. Where the blow-off lines from several digesters lead into one pipe, the handles of each cock should be adjusted or some other arrangement should be provided so that a man can see with a glance whether all cocks are set right or not. If valves instead of cocks are provided, a type with a rising spindle should be used.

SECTION 52. BLEACHING

520. **Bleaching Engines.** The bleaching engines should be completely covered on the top with the exception of one small opening, large enough to allow filling. This opening should be covered either by a sliding door or guarded with railing and toeboards. Platforms leading from one engine to another should be guarded to conform with the code on Floor Openings, Railings, and Toeboards.

521. **Mixing Rooms.** The room in which the bleach powder is mixed shall be well ventilated by forced draft if necessary to remove the excess of chlorine gas, and an approved type of mask and hand protection should be provided for employees working in this room. The exhaust for removing the chlorine fumes should be so arranged that all fumes are carried away from the work plane and breathing area of the workers and should be rendered neutral or harmless before being exhausted.

522. **Liquid Chlorine.**

a. **Storage Tanks.** Tanks of liquid chlorine shall be stored in an unoccupied room well ventilated and where its possible leakage cannot affect the workers.

b. **Neutralization.** The preparation of the liquid chlorine mixture shall be carried out in a room entirely apart from the general workroom, and the container for chlorine and its pipe connections should be enclosed in a separate chamber (glass paneled) supplied with a ventilating flue and fan. Where this is impossible, an exhaust should be installed at the floor level to extract any leaking chlorine.

c. **Face Protection.** Suitable masks shall be supplied in sufficient numbers and conveniently placed, and the workers who may possibly be exposed to chlorine fumes should be instructed as to their use.

523. See also Ventilation Code.

Part VI—Preparing Pulp for Paper Machine

SECTION 60. GROUND WOOD PROCESS

600. **Governors.** Grinding machines should be equipped with governors which will limit the speed of the machines below the speed at which breakage of the wheel is liable to occur.

601. **Grinding Machines.** The door of the center pocket should be provided with a pin which will prevent the door from falling on the hands of employees when filling this pocket.

602. Blocks should be delivered to the grinding

machines in such a way that blocks cannot fall or strike against the feet of operators.

603. **Butting Saw.** If this saw is used to cut long blocks, it should be set up permanently, and guarded as provided in the Woodworking Code.

SECTION 61. PULP SHREDDERS

610. **Feed for Shredder.** In addition to a warning sign for employees to keep their hands out of their shredder, there should be a slanting table or spout attached to the shredder to assist the feed of the machine.

611. **Wooden Paddles.** A wooden paddle should be used to clear a blockade of pulp in the shredder.

SECTION 62. BEATERS AND WASHERS

620. **Floors.** Floors should be cleaned daily to remove water, oil and stock, and sufficient drains should be provided to take care of all waste water.

621. **Wooden Paddles.** Wooden paddles shall be used to remove congestion in front of the beater rolls rather than valve hooks or pieces of wire and iron. Paddles which are damaged, shall be re-sandpapered or planed, so that slivers will not be a hazard.

Part VII—Machine Room

SECTION 70. GENERAL

Note: From this point on, there should be frequent reference to the requirements of the Power Transmission Code for details on guard construction for machinery and parts.

700. **Floor of Machine Room.** Floor of machine room should be subject to periodic inspection and should be cleaned daily and have sufficient adequate drains installed to carry off excess water.

701. **Ventilation.** Condensation on ceilings and moisture on hoods can be relieved by a good system of ventilation, which will insure plenty of fresh air from the outside and consequent removal of old air from within. See also Ventilation Code.

702. **Storage of Extra Parts.** Extra parts should be stored in cabinets from which they could be quickly and easily removed and should not be stored in a haphazard manner in the machine room.

SECTION 71. PRESSES AND DRIERS

710. **Steps.** Suitable steps with non-slip surfaces should be provided at each press upon which the operator may stand to pull out wet broke.

711. **Plank Walkways.** To eliminate the necessity of workmen standing on the press doctors, a removable plank of sufficient width should be provided along each press, with handrails installed wherever possible. See Code on Floor Openings, Railings and Toeboards.

712. **Drier Lubrication.** Safe means of lubricating drier bearings shall be provided. If rear bearings must be oiled while machine is in operation, a piping system or equivalent should be installed.

713. **Automatic Feed.** To protect against serious burns when putting the sheet through the driers of high speed machines a rope feed or equivalent should be used. Where a rope feed is not used, angular guards may be placed over the rotating drier edges.

714. **Drier Doctors.** Doctors should be provided on each of the lower driers.

SECTION 72. CALENDER STACK

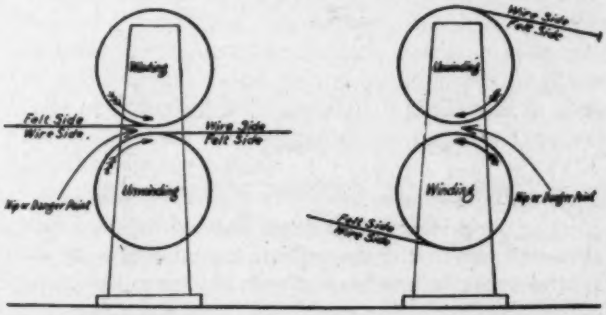
720. **Operating Rule.** Workmen should use extreme care when throwing paper through the calendars after a break. They should not force a wad of paper through but hold hands under the doctor, **palms up,** instead of down.

721. **Feeder Belt.** A feeder belt shall be used when starting paper through a calendar stack where the sheet of paper goes over the top calendar roll.

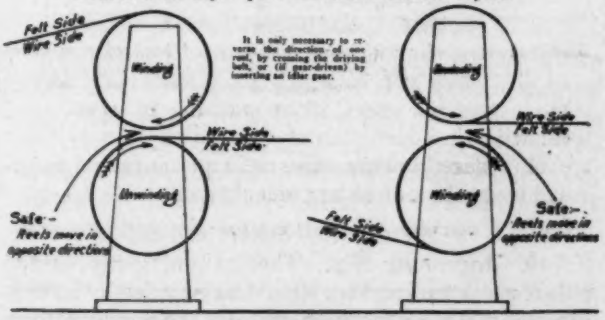
722. **Calendar Guards.** Guards for the calendar stack are also applicable for supercalendars. Doctors or other guards should be provided for supercalendars at all inrunning nips.

SECTION 73. WINDING REELS

730. **Rotation.** Wherever possible, the direction of rotation of two reels should be the same so as to avoid the formation of a nip into which the operator



Double deck dryer part—48-inch diameter dryers



Safe method of operating stack reels. Paper can be easily started on top roll if man is placed at each end of the reels. Note that in both methods the paper goes to the drum rewinder with the wire side up

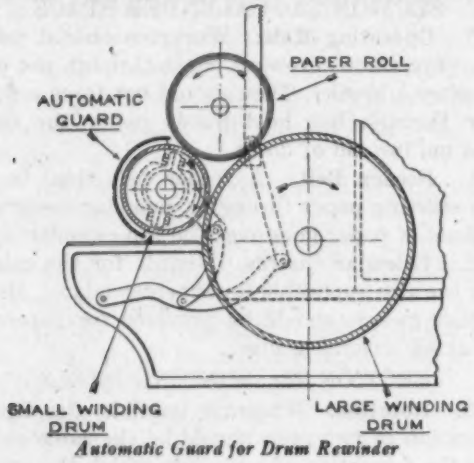
may be drawn if the space between the reels is small. On machines operated at 500 feet per minute and over, drum reels shall be employed with separate reeling stands.

731. **Operating Rule.** Operators of the revolving type of reel should be prohibited from getting between the frames and the winding part of the reel.

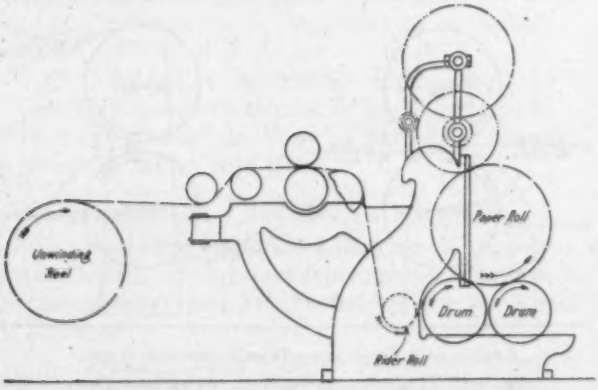
732. **Space Between Reels.** If it is necessary to run reels to a large diameter a space of at least 8 inches should be left between the reels. To do this, a safety stop can be provided by which the paper

coming from the stack is broken off when the reel becomes a certain diameter.

733. It is also possible to take care of the same hazard by making a frame to which is attached a



Automatic Guard for Drum Rewinder



Double-drum winder with rider roll insterted back of rear drum Front drum and paper roll turn toward operator and nip is eliminated

lever with an 8-inch diameter wheel at its end. This wheel is placed between the reels and is forced to revolve by contact of either reel surface.

SECTION 74. REWINDERS

740. **Inrunning Nip.** The inrunning nip on the side toward the operator should be guarded by a semicircular metal plate which encloses the winding drum and is automatically released as the size of the roll increases.

741. **Reversing Winder Drive.** Wherever possible, the winder drive should be reversed so that the nip is outrunning.

742. **Slitter Knives.** A stick should be used for letting down the slitter knives. Slitter knives can be protected underneath by the use of a sheet metal guard, and above by individual metal guards.

743. **Setting Slitters.** In setting slitters, it is advised that the smaller and most worn slitters be placed nearest the winderman, so that in case of paper catching at second or third slitter, he will not be cut by the larger slitter nearest to him.

744. **Removing Rolls.** The hooks of cranes used for removing the roll from the winder shall never be hooked to the shaft until the winder shaft has stopped.

745. **Core Collars.** Core collars with projecting set screws shall not be used.

Part VIII—Finishing Room

SECTION 80. SUPERCALENDARS

800. **Supercalendar Guards.** Supercalendars shall be guarded as provided for calendars. Doctors or other guards should be provided for supercalendars at all inrunning nips.

SECTION 81. COATING PROCESS

810. **Operating Rule.** Machine operators should be instructed never to try to remedy a blockade while the machine is in motion. The machine should be stopped, and the paper should be removed before starting.

SECTION 82. ROTARY CUTTERS, TRIMMERS, ETC.

820. **Trimmers.** All trimmers should be equipped with a two-handed throw, which is a device so that both hands of the operator are used to operate the machine when the clutch is thrown.

SECTION 83. PACKING, STORING, LOADING AND SHIPPING

830. **Preparing Cars.** Before loading cars of finished paper for shipment, they shall be thoroughly inspected and holes in the floor boarded up and all protruding nails removed. Inspection is particularly necessary if the car is already lined with paper. Workmen who line the cars shall remove such hazards.

831. **Portable Bulk-heads.** Portable bulk-heads should be constructed and be ready for use when partly loaded car is about to be switched. The load should be arranged so that the bulk-head will protect the loaded paper making it unnecessary for any workmen to remain in the car.

832. **Warning Flag or Sign.** A flag or sign should be placed at the end of the car towards the approach to the main line tracks so that switchmen will know that workmen are in the car.

Part IX—Qualifications and Duties of Workers

901. Foremen of the yard crews should be experienced safety men.

902. **Changing and Washing Felts.** When changing or washing felts employees should be cautioned of the dangers attendant to the operation, and the foremen should see that they follow instructions closely.

903. Employees shall not stand on edge or cover of the beaters.

904. Employees should be cautioned against putting hands between stretch roll and felts in order to clean roll of stock.

Budgetary Control in the Paper Mill

By H. M. GRASSELT

BUSINESS conditions during the last few years impressed the manufacturer with the fact, that the return of prosperity in the paper industry depends in a large measure on the enforcement of stringent economy in administration, manufacture and distribution. Consequently the three principal factors in attaining the end in view, viz:

1—Standardization

2—Elimination of Waste

3—Planning of Business Operations

are today the objectives of methodical study and consideration.

The first factor, Standardization, is to bring about uniformness in materials, methods and finished products, also in simplification of manufacture and distribution practices. It signifies that the multitudes of grades and brands eventually will be reduced to a limited but thoroughly sufficient number.

Elimination of Waste, the other factor, is indispensable to profitable management, and observations lead to the conclusion, that, throughout the industries, decisive steps are being taken to prevent or reduce waste.

The third principal factor in today's industrial life, Planning of Business Operations, means the coordination of the complex machinery of business into one perfectly functioning unit with a view of attaining a complete and comprehensive control of all phases of business.

The idea of planning business operations is not new by any means, for business men of all times planned their operations, but never before has the problem been studied so intensely as at present.

Today business operations and activities are planned ahead methodically, predetermined and shaped into a definite program for a certain period. In order to carry out this program and effectively control those planned and predetermined operations and activities, business is adopting the Budget System.

The purpose of budgeting is to centralize the various component elements and thus supply adequate means of controlling and surveying the entire sequences of operations and activities.

A budget will not directly effect profits or increase production and decrease costs, but it will check up operations and conditions and afford a comparison of actual operations and activities to those of a previous equal period. It will, properly founded and intelligently utilized, point out what steps may be taken to insure profits.

Obviously, the budget must be based upon actual figures from previous records over a certain period, intelligent interpretation and forecast of conditions and judicious estimation in the co-ordination of facts. It represents the co-ordinated estimates of departmental activities and expenses for the purpose of controlling them effectively.

A budget covering the entire organization, may be divided into three main groups, namely:

1—The Production Budget

2—The Sales Budget

3—The Financial Budget

with their respective various sub-budgets.

Since the individual departments are interdependent, their operations and activities must be jointly considered and their budget periods of necessity be of uniform length. Budget periods and requirements will vary according to the nature of business and conditions. In normal times, when prices and wages remain comparatively stable, a year may be taken as the budget period, while unsettled industrial conditions with attendant fluctuations in commodity prices and wages, will require frequent revisions of the budget.

Those fluctuations represent a great difficulty in the application of budgeting control and the individual organization must work out a plan whereby proper adjustments may be made to take care of that intricate problem.

The Production Budget

The production budget is the one part of the entire budgetary procedure which has a direct bearing upon manufacturing activities and, therefore, will be of interest to the practical man in the mill. The writer does not claim to offer a complete outline of the entire budgetary procedure; the article merely presents a few constructive suggestions along the line.

The component elements that go and make up the production budget are the estimated normal capacity production and the estimated normal manufacturing expenses, i.e., the estimated cost of labor, supplies (not raw materials, which are treated in a sub-budget), fixed charges, such as depreciation, taxes, insurance and auxiliaries (power, light, heat, repairs, etc.).

The accompanying, self-explanatory specimen of a production budget form for one month may be modified to suit individual requirements. Entries under estimated normal production and estimated normal operations respectively are based on previous records covering the normal production in an ascertained normal period.

Standard rates (departmental rates) are required

for cost work, and derived from the total of the estimated normal operating expenses.

Production and Manufacturing Expense Budget for January, 1923

Department and Items	Production		Per cent over or under	Expenses		Per cent over or under	Operations total E. H. or M. H.	Per cent of Normal Operations	Actual Expenses to date
	Estimated Normal Capacity Quantity	Actual True Quantity		Estimated	Actual				
(1) Rag Room Labor Supplies Fixed Chgs. Indir. Chgs. (Power, heat etc.) TOTALS	000	000	000						
(2) Bleach Dpt. Items as stated above	000	000	000						
(3) Washers Items as stated above	000	000	000						
(4) Beaters Items as stated above. Here the totals must be divided by the Number of paper machines and the results distributed to them.	000	000	000						
(5) Paper Mach. No. 1 Labor Supplies Fixed Chgs. Indir. Chgs. Beater Dpt.									
(6) Paper Mach. No. 2 Items as stated above									

For instance, if in the rag room the total estimated normal expenses amount to $1,200 a month, and 2,800 employee hours are normally required to do the work, the standard or departmental rate for that department will be 43c an employee hour. Or a paper machine, with an estimated monthly total normal expense of $5,000 for a normal operating time of 552 hours would have a standard or departmental rate of $9.06 a machine hour.

Fixed charges remain practically unchanged whether the mill runs full capacity or is partially idle. Consequently, if the mill runs part time only, actual production and operations expenses will naturally differ from the estimated budget totals and affect the standard rates accordingly. However, it would be a fallacious conclusion to use the rates that are based on the actual operating expenses in cost work. Manufacturing expenses not absorbed by standard rates, must be charged to the profit and loss account at the end of a cost period.

The production budget showing estimated production and manufacturing expenses is a good indicator of departmental activities. Whenever a department shows an abnormal deviation from the standard figures and percentages, investigation should be started immediately and the cause located. Furthermore, it comprehensively pictures the attained results and offers a means of a monthly check-up with the superintendent and foreman. These men take a keen interest in figures concerning their respective department when shown in a concise and understandable manner showing where and how economy wisely applied will effect profits.

Mills manufacturing a large variety of grades have to take that fact into consideration in the installation and operation of a budgetary system. Previous records will show a fair average production on which the estimated capacity production may be based.

If not possible to use quantities, normal production may be reduced to dollars, and the column provided for the entry of the estimated production may be used for the estimated equivalent in dollars.

Sub-budgets within the manufacturing budget are:

The Material Budget

The Purchase Budget

The General Plant and Equipment Budget

Many organizations carry the pay roll budget which includes an estimate of the entire pay roll. Since the budget for each functional department includes the labor cost, the general pay roll budget is, therefore, not necessary unless wanted for special purposes.

Although the budgetary system is more generally used in large organizations, the moderate sized or small mill will derive many benefits from its installation and operation.

Half Stuff

"A group of mill superintendents met February 5 to discuss the question of reclaiming dead heads. There were several in attendance."

A well known paper maker in the east hands us this one:

Reaching home early one afternoon he found his wife—a blonde, by the way—cozily located on the davenport reading his paper magazine. In response to his expression of surprise she answered, "There's a wonderful article in this magazine on bleaching. It gives all new ways —it doesn't even mention peroxide."

About the only advantage we can see to getting hurt is that one has a little time to study over his income tax.

A group of inventors is working on a process whereby bark from the pulp mill can be pressed into bricks and sold to the public to be used in place of coal. It's our opinion, however, that their bark is worse than their bituminous.

The Fourdrinier Machine

By HARRY E. WESTON
Instructor in Pulp and Paper Manufacture, The New York State College of Forestry, Syracuse, N. Y.

This is the third installment of the article on the Fourdrinier machine in preparation by the author. Further installments will appear in succeeding issues.
—Editor.

The Dryers

THE dry end is intended to remove the water that is left in the sheet after it leaves the last pair of press rolls. About 10% of moisture is left in the finished sheet of paper after leaving the dryers..

The dryer consists of a series of cast iron cylinders which must be carefully designed and constructed. It is necessary that the steam be admitted to the interior of the drying cylinders, and the condensation removed from them without moisture leaking to the outside. Various devices are used to remove this water of condensation.

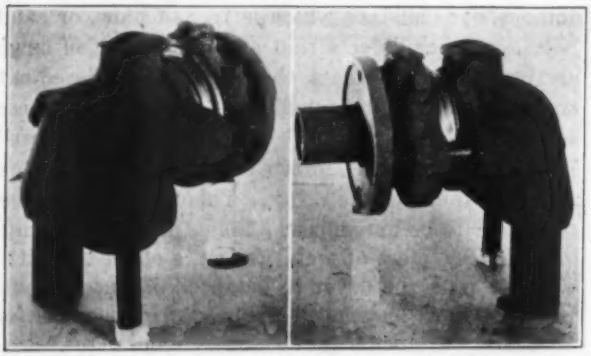
The cylinders should be turned perfectly true on the surface and polished. The castings must have a homogeneous surface which is free of blow, or sand holes, or other defects that are so common in large castings. In some cases, the cylinders are bored out smoothly so that the shell is of uniform thickness thruout its circumference. If dryers are not bored in this manner, they often contain more metal on one side than on the other. This condition causes the dryer to be unbalanced. Sometimes the bolting-on of a large piece of metal (so as to offset the extra weight) puts the dryer in balance. Paper machine builders have developed their own processes for accurately balancing the drying cylinders.

Vertical dryer section in operation Courtesy—Black-Clawson Co.

The drying cylinders may be arranged in several different ways as for example:

1. Double Deck.
2. Triple Deck.
3. Vertical Deck.
4. Nests—two, three or more.

The usual arrangement in American practice is the **Double Deck.** With this arrangement each tier of cylinders has one long dryer felt. The diameters



Courtesy—Black-Clawson Co.
Cut showing two views of Savery patent safety steam joints

of the cylinders used on dryers vary considerably, as do the number of cylinders used in an installation. Cylinders three to four feet in diameter are commonly used. A typical specification for the dryers of a paper machine might be given as follows:

Forty-three cast iron dryers 42" in diameter, 126" face, journals 7" in diameter, 10" long. All dryers to have perfect joints, surfaces accurately turned, balanced and tested under 50 lbs. steam pressure—to be mounted double deck. All dryers to be single head seamless type. Spacing and design of frames to be such that dryer part can be 3-decked at any time with a minimum of expense and inconvenience.

An iron corrugated footwalk is generally installed on both the front and rear sides of the machine extending the full length of the dryer part.

Dryers are frequently arranged in three tiers instead of two and are designated as the triple deck arrangement. The principal object of this arrangement is to economize in length of machine rooms or to add to already existing dryer parts where the available space will not permit the continuation of the double deck.

In some installations the dryers are stacked one above the other in two vertical stacks, a sufficient number of stacks being used to properly handle the machine production. Such a system occupies but little floor space, and can be enclosed by placing a light partition wall at both ends of the dryer section. These partitions confine a large part of the vapor to a small part of the machine room. Much condensation on machine room ceilings can thus be avoided. This system is particularly applicable to machines without dryer felts manufacturing thick heavy papers. The sheet ascends one column or stack and descends the next, the dryers in each stack being in the same relative position with one another as in the two tier arrangement except that they are in a vertical rather than a horizontal plane.

A table, as given by the manufacturers, covering the comparative length of space required for double-deck, triple-deck and vertical dryers six high, is as follows:

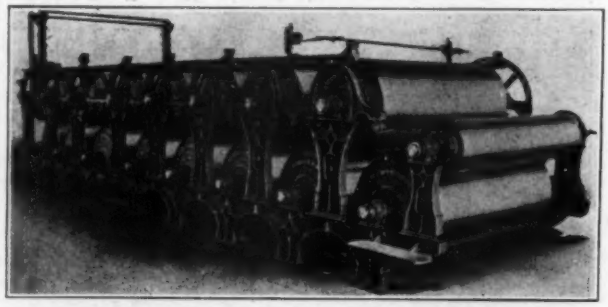
96-42" diameter double-deck dryers require about 200 linear feet.

96-42" diameter triple-deck dryers require about 155 linear feet.

96-42" diameter vertical dryers require about 65 linear feet.

Another arrangement that has been built to economize on space is that in which the dryers are placed in a gallery supported over the wire, couch and presses. As paper mills in this country are not, as a rule, built in localities where land sells at a premium, this system is not extensively used.

In European practice it is common to separate the dryers into two or three nests. An independent dryer felt is used for each nest. Such an arrangement has some advantages. It is possible to drive the nests at slightly different speeds. This variation in speed has certain advantages in making fine papers, as it permits the paper to shorten as it dries. Each of the long felts come in close contact with the



Courtesy—Black-Clawson Co.
Double deck dryer part—48-inch diameter dryers

wet paper as it comes from the presses and absorbs moisture. Wet felts shrink. This shrinking holds the paper tightly against the surface of the dryers, but as the felts become dry they tend to stretch in contrast to the shrinking of the paper. This system of nest arrangement does not offer itself so well to high speed production, and is very little used in this country. Installations are found in mills where a press for animal sizing is inserted between the two halves of the dryers.

The heating of the dryers is a very important operation. The dryers must be piped in such a way that the wet sheet of paper will not be scalded when it starts through the dryer. The dryers must also have sufficient capacity to handle the daily production.

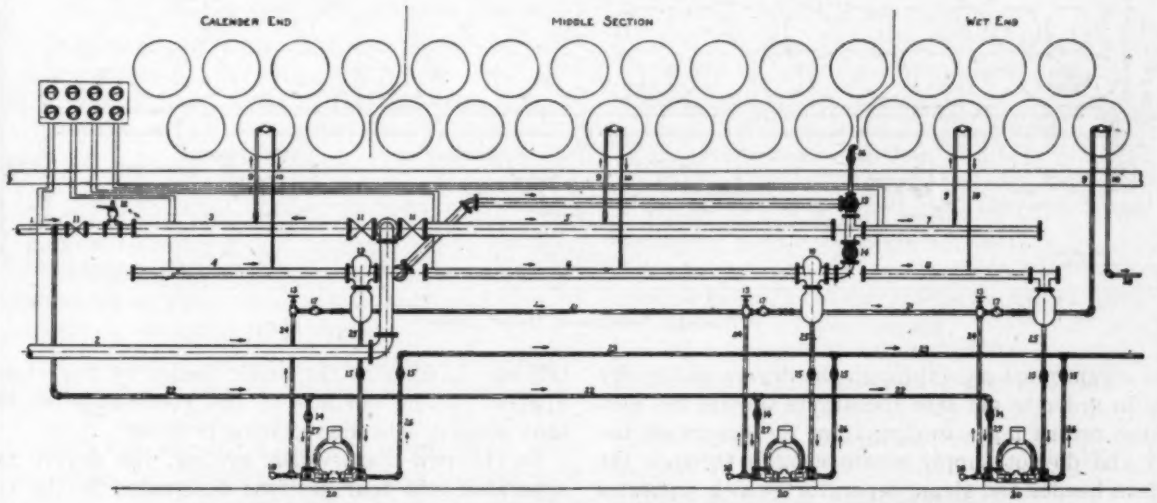
It is easy enough to get all the steam that is required for drying into the cylinders but the removal of the condensation is no easy task. The presence of water and air in the dryers often causes trouble. The proper piping of paper dryers cannot be too carefully emphasized. It requires experience in the making of paper to understand some of the difficulties.

A number of different systems of circulation and drainage control for paper machines are in common use. Two of the best known systems are:

1. The Crane System of Circulation and Drainage Control for Paper Machines.

tween the calender end supply header and the middle section supply header so that the pressures may be varied in order to obtain a lower temperature in the middle section than in the calender end section.

Large steam separators are attached to the return headers of both the calender end and the middle section. These separators remove the steam which has passed through the dryers from the condensation, and it is then carried into the wet end supply. A three-valve lifting trap removes the condensation from each separator, and an additional trap drains the drip pocket attached to the wet end of the machine.



CRANE SYSTEM OF CIRCULATION AND DRAINAGE CONTROL FOR PAPER MACHINES

1. Live Steam Supply
2. Exhaust Steam Supply
3. Calender End Supply
4. Calender End Return
5. Middle Section Supply
6. Middle Section Return
7. Wet End Supply
8. Wet End Return
9. Steam to Dryer
10. Return from Dryer
11. Control Valve
12. Pop Safety Valve
13. Angle Valve
14. Globe Valve
15. Gate Valve
16. Hand Vent
17. Check Valve
18. No. 8 Hoffman Valve
19. Steam Separator
20. Cranetilt Metering Trap
21. Trap Vent Header
22. Auxiliary Steam Header
23. Trap Discharge Header
24. Trap Vent
25. Trap Inlet
26. Trap Discharge.
27. Steam to Trap
28. Condenser Dryer Discharge

Courtesy—The Crane Co.

2. The Farnsworth Forced Steam Circulation system.

The Crane System has been based on the principle of re-expansion of unused steam from the calender end dryers into the wet or press end dryers of the paper machine.

The machine headers are divided into three sections, each section serving one portion of the machine—the calender end, the middle section, and the wet end.

The calender end supply header receives its steam from either the engine exhaust or the live steam supply, whereas the middle section supply header only receives exhaust steam, and the wet and supply header receives only steam that has passed through the first two sections. Control valves are located be-

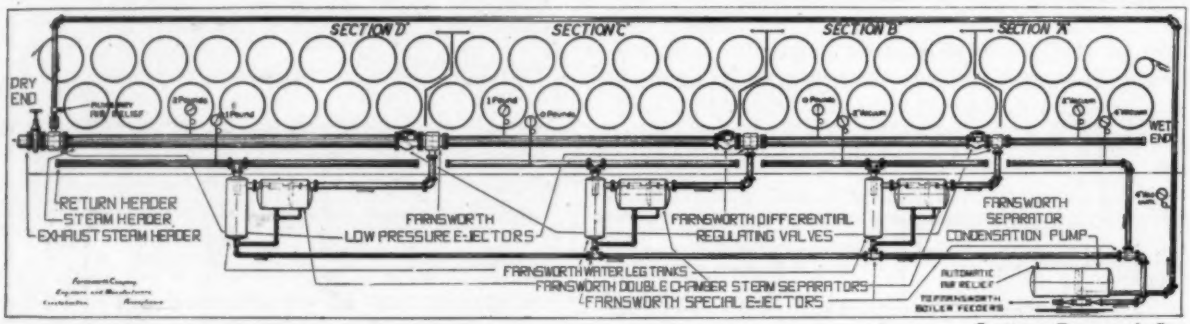
The vents of the three traps are connected into a common header which discharges to the first dryer on the wet end of the machine in which all the steam vented by the traps is condensed and exhausted to either a hot-well or a small vacuum pump, depending upon the pressure conditions throughout the machine.

A hand vent line is connected to the wet end steam supply to aid in the removal of air on starting the operation, and should be left open until steam has replaced the air. Circulation throughout the calender and middle sections of dryers is maintained by the condensing action of the wet end dryers. The circulation through the wet end is secured by the connection to the first or condenser dryer.

A pressure gauge is connected with each supply

and return header and is mounted on a gauge board on the machine room floor so as to be visible to the machine-tenders at all times. The system will show pressures ranging from high on the calender end to low on the wet end when it is being properly operated.

The Farnsworth Forced Steam Circulation System divides the paper machine dryers into two sections designated as the wet end and dry end sections. The wet end section includes 25% of the dryers while the dry end section includes the remaining 75%. The system of piping and draining is so arranged as to make the dryers on the dry end of the machine a part of the steam line supplying the wet end dryers.



Courtesy—Farnsworth Co.

The new Farnsworth drying system

The steam must pass through the dryers on the dry end in order to get into the dryers on the wet end. If the return pipes coming from the dryers on the dry end do not supply steam enough through the return header and steam separator (which separates the condensation from the steam which has blown out into this portion of the return header) to give the desired pressure on the wet end, then steam is bypassed through the steam valve or main steam header to build up the pressure on the wet end. The steam separator on the return header of each dry end section removes the water and only allows steam to pass into the dryers of the wet end section.

The steam separator is drained by a duplex pump. The condensate is pumped under pressure direct to the boiler feeder which is generally located 3 to 10 feet above the high water line of the boilers. Thus it is fed direct from the paper machine into the boilers at a high temperature and under pressure.

The Farnsworth Condenser type condensation pump draining the return headers of the wet end sections condenses the vapors and creates a vacuum on the return header. It condenses steam enough from the return header to pull the water and air out of the dryers on the wet end or to cause a high velocity of steam through the wet end section of dryers. This machine, the duplex condensation pump, is equipped with cold water sprays which condense the vapors in the return line and produces a forced steam circulation.

The dryers on the dry end are hottest, there being a gradual decrease in temperature as the wet end section of the dryers is approached.

The duplex boiler feeder has a receiving and a delivering chamber. One chamber is always receiving while the other is delivering the condensation directly into the boilers, thus giving a high feed water temperature.

The condensation from all high pressure traps is discharged directly into the line leading to the receiving chamber of the boiler feeder. The condensation from all low pressure heating systems, fan coils, etc., drains into condensation pumps, either simplex or duplex types, and is forced up to the receiving chamber of the boiler feeder by live steam applied on the surface of the condensate in the tank while it is in the receiving position.

In the new Farnsworth system, the dryers are separated into four sections designated in the cut as Sections A, B, C and D.

The steam enters header section D, passes into the dryers in this section and out through siphon pipes or buckets to section D return header. Water is separated from the steam in a drip leg tank and steam separator. The dry steam passes to Section C steam header. The condensing effect of the wet paper upon the steam passing through the remaining sections of the dryers causes a drop in pressure between the steam and return header of section D. If the regulating valve between section D and C is set at 1 pound, this drop in pressure of 1 pound will cause the water in the dryers to be removed at a velocity of 7,000 to 14,000 feet per minute through the siphon pipes or buckets. This removal of water at such a high velocity causes a high circulation of steam within the dryers, and keeps the dryers as hot as the dry steam will make them.

Any desirable drop in pressure for machine operation may be obtained by adjusting the weights on the regulating valves.

In like manner, the steam is circulated from section C to and through sections B and A. A condensation pump connected with an ejector at the dry end pulls a vacuum on the return header of section A, causing a high

velocity of steam through the dryers and also drains the steam separators. A condensation pump automatically pumps the high temperature condensate to the boiler feed system where it can be fed directly into the boilers at a higher temperature than normal.

The ejector tees on the main header between each section helps to cause a high velocity of steam through the dryers as the regulating valve opens when insufficient steam is supplied from the return header of the previous section. Temperature throughout the machine is controlled proportionately by the regulation of the main control valve at the dry end.

Power Plant Management

Permanent Statistics of the Power Plant

By ROBERT JUNE, Mechanical Engineer

COMPLETE permanent specifications of equipment, properly filed, are not found in as many modern power plants as they should be. This is due to some neglect or lack of knowledge of how to proceed to keep these statistics in good shape rather than to lack of appreciation of their importance. It is indeed unusual to find the plant in which the operating engineers do not have some statistics written down in their pocket notebooks. Every one will agree that the pocket notebook is not the place for this data. It should be kept in a formal manner and the records should be available at all times regardless of changing plant personnel.

The keeping of accurate specifications of equipment installed greatly facilitates the making of repairs. It is of great value when the new engineer comes on the job, and it has a very important function in the adjustment of fire losses, should such occur.

The presentation of specifications of equipment not only serves as an accurate inventory of the contents of the plant but strengthens the case for the owner and is particularly valuable when the owner has gone to considerable expense to maintain old equipment lost in a fire. Moreover, in the event of a fire, such of the old equipment as it is desirable to replace can be ordered without an instant's loss of time. The completeness of the specifications should increase with the value of the investment in the plant.

Power Plant Building

Figure I indicates the desired specification data on the power plant building. This form is, of course, subject to some modifications, depending on the individual structure. However, all of the information contained in this form should be filed in ordinary cases, and if the building is large additional information will suggest itself.

This information is, of course, of great value in connection with the plan of new buildings and additions, and is also of value to the accounting department in setting up depreciation reserves.

As an illustration of the value of these records, let us suppose that we want to construct an additional building. The specification data tell us where we can match the cut stone or terra cotta trim of the original building. If new equipment is to be installed, we can tell by immediate reference to this sheet what the permissible floor load is. If any of the materials of construction, such as roofing, becomes defective, we can readily tell who the manufacturers were and ascertain at once whether a guarantee has been made to cover the life of this particular part. If we get unusually good service out of flooring, painting or roofing, and wish to use the same specifications in another building, we can get the data from this sheet.

FIGURE I
POWER PLANT BUILDING DATA

Dimensions—Length .....Width.....Height.....
Type of construction—Steel, concrete, wood, combination.....
Name of general contractor.....
Name of excavating contractor.....
Foundation down to elev.....
Kind of soil with permissible load.....
Floor loads permissible—Engine room.....Basement.....
Boiler room .....
Masonry contractors .....
Cu. yd. of concrete and proportion used—Foundation.....
Yd. prop.....Walls .....Floors .....
Structural Steel fabricated by.....
Lb. of steel—Reinforcing.....Structural.....
Common brick.....M. Face brick.....M. Manufactured by.....
.....Enameled brick.....M. Manufactured by.....
.....Cut stone.....cu. ft. Manufactured by.....
.....from.....Quarry. Sash—Wood.....
Steel.....Manufactured by .....
Terra cotta cu. ft.....Type of roof.....Guarantee
Manufactured by.....Lighting type.....
Manufactured by.....Plumbing and heating.....
Manufactured by.....Ventilators.....
Installed by.....
Glazing.....Completed.....
Painting.....Installed by.....
Floor preservative.....Installed by.....
Guarantee.....Done by.....
Total cost.....Manufactured by.....

Boiler Data

The boiler room is often the heart of the entire plant. If something goes wrong with the boiler, it affects progress in all departments. We need to have complete information regarding the boilers available at all times. True, we usually have blue prints, or ought to have them. The actual installation, in some instances, may vary from the blue prints, but there is a certain amount of information regarding the boilers to be obtained from the specifications furnished by the manufacturers. It is possible to put all this information in one place and on a single sheet such as Figure II.

FIGURE II
BOILER DATA

Plant No.....Builders No.....
Location .....
Manufactured by .....
Factory address .....

Nearest office address.....
Man to call regarding repairs.....Phone.....
Date installed.....By whom.....
Type.....Weight boiler.....Weight water.....
Tubes, No.....Diameter.....Length.....Made of.....
Steam pressure gauge.....Safety valve—(Pressure.....
Type.....Diameter.....Number.....)
Steam space, sq. ft.....Water space, cu. ft.....
Heating surface, sq. ft.....Superheating surface, sq. ft.....
Area of grate.....Type of grate or stoker.....
Rated horsepower.....Ratio of heating surface to grate are
No. of steam drums.....Dia. of steam drums in.....
Thickness of shell, in.....Thickness of head, in.....
Type of joints.....Dia. of steam nozzle, in.....
Dia. of blowoff, in.....Dia. of feed pipe in.....
Temperature of feed water.....Type draft.....
Maximum draft.....Height of setting.....
Length of setting.....Thickness of walls.....
No. of fire brick.....No. of common brick.....
Distance between batteries.....Distance from back of boiler to wall.....Distance from front of boiler to wall.....
Manufacturer's guarantee .....
Combined boiler efficiency—100 per cent rating.....
200 per cent rating.....300 per cent rating.....

Economizer Data

If economizers are installed in connection with our boilers, we want the data concerning them to be as readily available as that of the boilers. If economizers are equipped with scrapers, there is frequent need to make replacements, and we also want the manufacturers to guarantee this equipment for us so that we can check up the performance of the equipment. Figure III gives this essential information.

ECONOMIZER DATA
FIGURE III

Plant No.....Builders No.....
Location .....
Manufactured by.....
Factory address.....
Nearest office address.....
Man to call regarding repairs.....Phone.....
Date installed.....By whom.....
Type.....Weight economizer.....Weight water.....
Tubes, No.....diameter.....length.....Made of.....
Heating surface per sq. ft. boiler heating surface, sq. ft.....
Heating surface per boiler horsepower (34.5 lb. water per hr.) rated capacity, sq. ft.....
Cleaning: If by scrapers.
Type motor....H.P.....A.C. or D.C.....voltage.....R.P.M.....
Make motor.....From whom purchased.....
Name and address to call regarding repairs.....
.....
Cleaning: If by mechanical soot blowers.
Make of soot blower.....Type.....No. of units.....
Size riser pipe.....Size header.....
Make and size of valves.....Name and address to call regarding repairs .....
Manufacturer's Guarantee: Feed water lbs. per hr.....
Temperature leaving economizer when entering at 180 deg. F.....Gas temperature entering deg. F.....Gas temperature leaving deg. F.....
Gas temperature difference.....

Soot Blower Data

Economical soot blowers insure high boiler efficiency and save fuel. They are an essential part of our equipment and it is extremely important that we should keep the blowers in the best operating conditions at all times.

A sheet made out in accordance with Figure IV gives us all of the essential data on this important piece of equipment.

SOOT BLOWER DATA
FIGURE IV

Boiler No.....
Location .....
Manufactured by.....
Factory address.....
Nearest office address.....
Man to call regarding repairs.....Phone.....
Date installed.....By whom.....
Type.....Trade name.....
Number of calorized units.....
Number of plain units.....
Diameter of header.....
Diameter of risers.....
Diameter of drains.....
Location of units (see blue prints).....
Diameter of nozzles.....
Type of nozzles.....
Make of main valve.....
Make of individual valves.....

Condenser Data

In Figure V we have a typical figure to keep our condenser statistics. Here we have all the necessary data on length, diameter, and thickness of tubes, data on circulating, dry vacuum and hot well pumps, capacity of the condenser, etc. This information is of great value to the operating force.

CONDENSER DATA
FIGURE V

Plant No.....Building No.....
Location .....
Manufactured by.....
Factory address.....
Nearest office address.....
Man to call regarding repairs.....Phone.....
Dated installed.....By whom.....
Type.....Weight Condenser.....Weight water.....
Tubes, No.....0. Diameter....Thickness....Length....Made of...
Cap. lb., steam per hr. at.....in. vac. and cooling water at deg. F
Steam condensed per sq. ft. of surface, lb.....
Total tube surface per condenser, sq. ft.....
Manufacturer's guarantee: with...gal. 70 deg. ctr. water, vacuum in condenser.....in.....Hot well temperature.....
Cross sect. area intake tunnel..sq. ft...Discharge tunnel..sq. ft.
Circulating pumps.....Type.....
Manufactured by.....Address.....
Size.....Capacity, gal. per minute.....
Circ. water pumping cap. per lb. of steam condensed at consumption of.....lbs. Per Kw. Hr. Lbs.....
Cooling water per lb. of steam at full load, lb.....
Screens at circulating water intake, type.....
Dry Vacuum Pump.....Type.....
Manufactured by.....Address.....
Size .....Capacity .....
Hot Well Pump—Type.....
Manufactured by.....Address.....
Size.....Capacity gal. per minute.....
Remarks .....

Feed Pump Data

In filling out our feed pump statistical data sheet, Figure VI, we should tell whether the feed pumps are centrifugal, reciprocating or rotary, and should give the diameters and sizes of the main parts. In connection not only with the feed pump data but with the data of other types of equipment, it would be well to maintain a file of catalogues, and particularly of spare parts catalogues.

FEED PUMP DATA
FIGURE VI

Plant No.....Bldg. No.....
Location .....
Manufactured by.....
Factory address.....
Man to call regarding repairs.....Phone.....
Date installed.....By whom.....
Type .....Weight .....Stroke .....
Diameter of steam cylinder.....Diameter of water cylinder.....
Displacement per stroke, cu. ft.....
Number of strokes per minute, average.....
Steam pressure, per lb.....Back pressure, per lb.....
Number of valves.....Type of valves.....
Pounds of water per 24-hr. average, actual.....
Dia. of suction....Dia. of steam discharge..Dia. of steam pipe..
Dia. of exhaust....Dia. of steam drips.....
Piston packing.....Size.....
Rod packing.....Size.....
Temperature of feed water deg. F.....
Suction head lb. per sq. in.....
Discharge head, lb. per sq. in.....
Remarks .....
.....

Chimney Data

As the chimney is not a complicated proposition, we do not need to record as much information regarding it, but there are a number of points which should be noted and filed. These are covered in Figure VII.

CHIMNEY DATA
FIGURE VII

Plant No.....Bldg. No.....
Location .....
Manufactured by.....
Factory address.....
Man to call regarding repairs.....Phone.....
Date installed.....By whom.....
Type .....Weight .....tons
Construction material data.....
.....
.....
No. of boilers served.....

Stack area per 1,000 sq. ft. of boiler heating surface.....sq. ft.
Height above grate, ft.....Size at breaching.....
Diameter at top.....
Amounts of material used.....
Common bricks, No. of.....M
Fire bricks, No. of.....M
Yards of concrete.....Reinforcing steel.....
Sheet steel.....
Remarks .....
.....

Turbine Data

Turbine data covers the capacity, operating conditions, performance guarantees, etc. It is a very good thing to have this information constantly before the operating men as they are much keener to check up results with actual records. (Figure VIII).

TURBINE DATA
FIGURE VIII

Plant No.....Bldg. No.....
Location .....
Manufactured by.....
Factory address.....
Man to call regarding repairs.....Phone.....
Date installed.....By whom.....
Type .....Weight .....R.P.M. .....
Heaviest piece to be lifted by crane.....tons
Operating pressure.....Operating superheat, deg. F.....
Exciters, No.....capacity each, kw.....
Types .....Manufactured by.....
Main unit cap. per kw. of exciters installed, kw.....
Performance guarantees
Operating conditions:
Lb. press. abs.....Deg. F. superheat.....
In. vac. condenser.....In. barometer.....
Net. kw. load of generator.....
Lm. of steam per kw. hr.....
For different pressures and deg. above or below normal temperatures following factors to be used.....% for each 15 lb. press. for range of 25 lb. above or below normal.
Blade data.....
.....
Remarks .....
.....

Method of Filing

The forms outlined herein should properly be made out in duplicate, one copy on file in the superintendent's office, or in the main office, and one in the power plant. They can well be made out on typewritten sheets, placed in loose leaf record books.

The forms given cover the principal equipment. Forms will suggest themselves for the minor items of equipment and these can be made out, using the forms given herein as a guide.

If an engineer has before him complete information of all details of the equipment which he is handling, he is encouraged to keep close watch over performances. The forms can be very easily made to suit the particular conditions of any given plant and they can very easily be filled out.

Safety First in the Beater Room

By PAUL DE GUEHERY

THE possibilities of accident in a modern beater room are so altogether remote that it is difficult to conceive of any at all. The places, however, where accidents are liable to occur are not to be looked for **in** the beater room but **under** it and in adjoining rooms where machinery is placed. These places are, of course, part of the beater room. In an article published in the August, 1922 issue of THE PAPER INDUSTRY, called Safety in the Beater Room, by Frank A. Drumb, the author dealt with the subject in quite an exhaustive manner. I should like to make a few remarks on one of his statements. Regarding Safety First he says that these problems are easily solved through proper supervision.

Most every mill, especially the larger ones, have their special safety departments which conduct splendid educational campaigns and have done much good to lessen the number of avoidable and unnecessary accidents. They have organized safety committees among the employees and put up signs throughout the mill in order to keep the slogan "Safety First" everlastingly before them, drawing their attention to various places and incidents of the daily routine where accidents are liable to be the result of thoughtlessness or carelessness. But I have never seen a sign reading anything like this:

> "Mr. Manager, Superintendent, Foreman: You **are responsible** for the safety of your men; You will be **held responsible.** Do your duty. **Enforce** the Safety rules."

It is understood that a superintendent cannot be held responsible for every little accident that may happen in the mill, nevertheless he should **feel** responsible.

In order to illustrate exactly what I mean I shall relate a few incidents that I personally witnessed.

At one time I received the following reply upon my call for greater care, "Oh, never mind, a fellow has to take a chance once in a while." And that from a superintendent standing by and ordering his men to do work with an unnecessary risk; where one little slip would have meant instant death. If that particular job had to be done and could not have been done otherwise he should have warned his men against taking chances. In the above related case it would have caused but a little extra work and no trouble to the proper operation of the mill, to stop the machinery and finish the job in perfect safety.

At another time I entered the mill where I was working and found the following:

A Jordan was installed in such a way that the pulley and the end of the shaft were extending about three feet out into the gangway between the machine room and the beater room. Now this in itself is a very dangerous arrangement and actually a fault of the engineering department, but we had to make the best of it. There was quite a heavy traffic passing through that doorway—broke cars, stock cars, etc.; also, a good portion of the material destined for the store room had to be carried past that protruding pulley. There had been a heavy guard rail built around it, but one day I came into the mill and found that it had disappeared. The machines were running full speed, a 14" belt pulling about 150 H.P. was twirling that Jordan at the rate of 350 R.P.M., the belt coming from below through two gaping holes in the floor **—and no guard around it!** And all the traffic pass-

ing by as usual. Nobody seemed to pay any attention to that live, accident inviting pulley.

I didn't take time to imagine what might have happened if any one had been pushed against it or had slipped on the oily floor. I simply stopped it at once as the Jordan was driven from a lineshaft in the basement. At that moment, I didn't care what else hung on the same shaft. I saw only that horrible death trap.

The missing guard we found laying in the machine room. Upon my investigation as to why that guard had been removed I discovered that the belt on the Jordan had been taken up some three hours before and for those three hours that pulley had been running almost in the middle of the gangway unprotected.

Should it not have been advisable to hold the man in charge actually responsible for such inexcusable carelessness? And is, for instance, the beater engineer alone to blame for it? No; it is the spirit of the management and supervisor that is reflected in the caution or lack of caution of the men. If the managers and superintendents would always enforce a sensible safety code, the men themselves would be more careful. I know of one particular mill, whose name I do not want to mention, where the spirit of safe operation reflects itself in the employees to such an extent that one can easily detect a former employee of that particular mill.

The human element constitutes the biggest and most valuable item of all the costs that enter into the manufacture of paper. By giving its preservation our most careful consideration, we not only help our fellow working men but ourselves as well.

No law, no rule, no regulation has any value unless it is enforced and practiced.

Pointers for the Engineer

By W. F. SCHAPHORST

Damper Regulators

THE function of the damper regulator in the boiler room of the paper mill is to simply diminish or increase the total flow of properly proportioned air. Obviously, the best place to do this is in the breeching or uptake—not at the entrance to the fuel bed.

If placed at the entrance to the fuel bed it would be necessary to proportion both the primary and secondary air simultaneously which would be a rather difficult thing to do. It is much simpler to control the gases all in one duct after they have combined.

The function of a chimney, where forced or indirect draft fans are not used, is to supply by suction enough air for complete combustion, and, at the same time, it must carry away the burned gases.

A chimney is, or should be, proportioned so as to be capable of giving sufficient draft to cause the boiler to develop considerably more than its rated power in case of emergencies. This means that for a normal boiler load most chimneys are from 50 to 100 per cent oversize. Hence, unless automatic means are employed to reduce or properly proportion the pulling power of the chimney by operating a damper, from 50 to 100 per cent more air is fed to the fire than is required. The result is, of course, that the excess air becomes a burden to the furnace, and must be heated up to the temperature of the furnace. Then it is emptied into the atmosphere at a high temperature, causing a considerable loss of fuel. Or, so much excess air is drawn into the furnace that the furnace temperature in certain parts is cooled below the temperature of ignition, resulting in the escape of unburned gases up the chimney. This loss may be even greater than the first loss mentioned in this paragraph.

Why Is a Belt Stiff?

AN excellent way in which to make a study of belt fibre action is to take a pad of scratch paper such as you frequently have on your desk, or a United States Government bulletin, or something of that sort, and bend it. It is easy to bend a pad of paper when the motion of the ends of the paper is unrestricted. You will note that one sheet slips along on the other a short distance. There is no tension on the convex side or compression on the concave side of the bent pad. Glue the ends together or hold the ends tightly with the hands, however, and it will be found more difficult to bend the pad. There will be a "buckling" on the concave side. The convex side will be in tension.

Glue the whole pad together by saturating it in glue and drying and you will have a chunk of material that will be as difficult to bend as cardboard or even as difficult as wood. This is because buckling becomes impossible on the concave side if the gluing job is properly done. There is no sliding. There is a certain plane close to or at the center that is neither stretched nor compressed when the "board" is bent. That plane is called the "neutral axis." On the concave side of that axis the fibres of the board are in compression. On the convex side the fibres are in tension.

The thicker the board, the greater the force required to bend it. This is true because the fibres farthest away from the neutral axis have a longer lever arm than in a thinner board. And that is why steel I-beams, channels, Z-bars, etc., are made for

engineering structures—to put the outside steel fibres as far away as practicable from the neutral axis.

This now explains why belts may be stiff or pliable. The dry, hard leather belt that is not lubricated in its fibres is naturally stiff because the fibres have difficulty in rubbing one over the other. Thus you will find it more difficult to bend a pad of sandpaper or emery paper, for example, than a pad of smooth writing paper. The dry, hard belt does not permit its fibres to slide on one another so easily on the tensile side nor on the compression side. The treated lubricated belt, on the other hand, permits its fibres to slide with greater freedom. There is no "grinding" as in a pad of sandpaper.

This method of studying the belt will clear away many of the points that have possibly been troubling many belt users. It explains why double or three-ply belts are stiffer than single belts. It explains why properly dressed belts are more pliable than undressed belts of the same thickness. It shows why lapped cement joints have a tendency to loosen or "shear" and why the cement used in any belt must be "good." Pick up a pad or bulletin one-fourth of an inch thick or so and try it.

Reversing Without Twisting Belt

EVERY once in a while the writer comes across belt drives similar to Fig. 2 in which pulley B is the driving pulley and A the driven pulley. The reason for this unusual arrangement is that pulley A must rotate in a direction opposite to B, which would not be obtainable, of course, if a regular open drive were employed.

To reverse the direction of the driven pulley the most common practice is to simply cross the belt, and it is the method to be recommended where belts are narrow or where there is sufficient distance between shaft centers so that there will not be too much internal friction in the belt due to abrupt bending nor too much rubbing of the belt against itself at the crossing point.

The arrangement shown in Fig. 2 is objectionable, however, because of the fact that one of the idler pulleys must resist the pull of two tight belts as indicated, the words "Tight" and "Slack" having been lettered between the pulleys in both Figs. 2 and 3. Thus the upper idler pulley in Fig. 2 is subjected to a greater bearing thrust than is the main driving pulley B, the latter having a tight belt approaching and a slack belt leaving, which is as it should be for a driving pulley. Whenever idler pulleys are employed both approaching and leaving belts should always be slack. Idlers should be operated with as little friction as possible.

Fig. 3 is an arrangement that should always be preferred to Fig. 2 for the above mentioned reasons. The drive is reversed, the belt is not crossed, and the idler pulleys are not subjected to great bearing thrusts because in both instances the approaching and leaving belts are slack.

Should there be insufficient space for an installation similar to Fig. 3 it would be better to install a

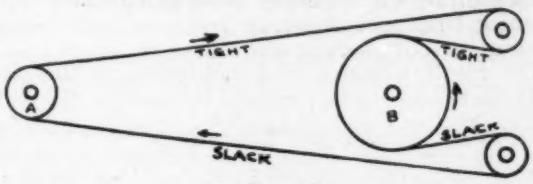


Figure 2

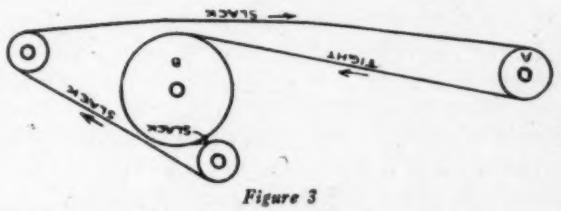


Figure 3

third idler pulley if necessary, so that the slack side can hug the driver all the way around, rather than resort to the tight idler method shown in Fig. 2.

How Much Can the Paper Mill Afford to Pay for a Soot Cleaner?

OFTEN, these days, engineering problems are figured on a capitalization value basis. For example, one engineer figured the "capitalization value of a steam leak" and he found it to run up into the thousands of dollars for the smallest leak; that is, the cost of almost any leak represents interest on a comparatively large capital sum.

In the same way, it is well to compute the capitalization value of engineering products such as cleaners for boiler tubes—inside and out—belt dressings, feed water heaters, economizers, forced draft blowers, boiler feed regulators or paint for keeping air from leaking through brick settings into combustion gases, thus diluting them, and so on. Invariably it is found that these fuel-saving devices are very good paying investments.

As the writer has been doing some computing on soot cleaners of late, a formula was developed to assist the possible purchaser in determining the amount of money he can afford to spend for such a cleaner. The formula is:

$$4\,C\left|\left\{\frac{W}{\frac{E\,H}{457\ (T-t)}+1}\right\}-42\,N\right| = \text{Value of cleaner in dollars}$$

where W=number of tons of coal burned per year; C=cost of coal per ton in dollars;

E=boiler efficiency in per cent before installation of the cleaner;
H=heat value of coal in B.t.u. per pound;
T=temperature of chimney gases before installation of soot cleaner.
t=temperature of chimney gases after installation of soot cleaner;
N=number of boilers in use.

The result obtained by substituting in this formula could perhaps be properly termed the "capitalization value of a soot cleaner." The formula assumes that the purchaser of the cleaner expects to realize 25 per cent on his money including interest, depreciation and upkeep.

For example, if the annual coal consumption in a given furnace is 10,000 tons of coal per year, heat value of coal 12,000 B.t.u. per lb., boiler efficiency before installation of the cleaner is 70 per cent, temperature decrease (T-t) is 50 deg. F., number of boilers is one, and the cost of coal is $5.00 per ton, substitution in this formula will show that the boiler owner can afford to pay $4,460 for a cleaner.

In the above formula, it is assumed that 18 lbs. of air are used per pound of coal as fired, that there are six elements in an average installation, that the boiler is cleaned four times per day, that the boiler is cleaned and operated 300 days per year and that the average rate of evaporation is 6 lbs. of steam per pound of coal.

How to Know Any Key in the Dark

IN view of the fact that it is often necessary for nearly everybody to locate certain keys in the dark the writer believes that the following kink will be of interest:

Simply file notches in the back of the key (Fig. 1). The number of notches indicates the key. The

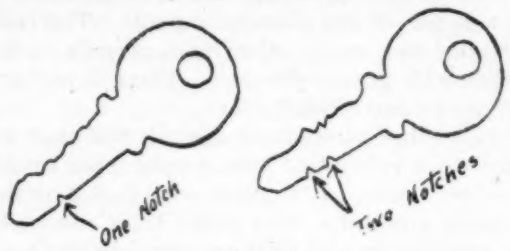


Figure 1

writer has filed one notch in the most important key, two notches in the key of second importance, three notches in the key of third importance, and so forth. It is easy to remember which key is most important, next in importance, and so forth.

Grease Lubrication

By HARRY C. KNEEZEL
Sales Engineer, Adam Cook's Sons, New York City

ONE of the first big problems that confronts the executive today is the procuring of sufficient power to properly operate his plant at a cost within reason. Coal must be purchased at the right price and safely stored in sufficient quantities to carry the plant over a given period of time. Upon its arrival at the plant, the coal must be carefully checked for weight and in the storage pile at regular intervals are placed recording instruments to safeguard against fire losses. Samples of the coal are carefully analyzed and as it is fed to the individual boilers, an accurate record is taken and the exact number of pounds charged against each boiler. In the modern plant we find automatic stokers, blower installation, etc., and at every step a recording instrument busily making charts covering every phase of the conversion of coal into steam. "What is your cost per unit" is a question we can ask any worth while executive and be assured of receiving a prompt and correct response.

Can you imagine a system any more fool proof? And yet, because there is at the present time no practical commercial instrument to record "Friction," the average executive stops when he has generated his power. This, in spite of the fact that friction alone is responsible for over seventy-five per cent of our scrap piles and unaided has robbed many an industrial plant of as high as forty per cent of the original power generated. Imperfect lubrication of even one bearing consumes power. Multiply this loss by hundreds of bearings and imperfect lubrication has wasted a vast amount of power—power that costs a thousand times more than good lubrication. Power that has been carefully watched and guarded in the making is deliberately thrown away.

Friction has never been entirely overcome. However, it is both possible and practical to reduce this friction to a minimum through proper lubrication which is effected by interposing between the friction surfaces films of liquid or soft solid substances. These substances are called "Lubricants" and are with a few exceptions fluids, semi-fluids, or non-fluids capable of forming and maintaining between friction surfaces films of sufficient thickness to keep the surfaces apart, thus abolishing the solid friction and substituting for it the considerably less friction of the lubricant itself. The subject of "Grease Lubrication" presents such a wide field, is of such great importance and such varied characteristics that we cannot hope to treat it here otherwise than in a general manner.

Fortunately, we are no longer in a period where engineers design a machine and then sit down and wonder how it is going to be lubricated. The modern designing engineer collaborates with lubrication specialists and the general tendency of the times points strongly towards a more intelligent application of grease lubrication. We realize that every executive

has at the present time under his jurisdiction a certain amount of machinery, in the building of which sufficient thought was never given to proper lubrication and with the view of assisting these executives in so far as grease alone is concerned, the following suggestions are submitted: First—It might truthfully be said that the analysis of greases to determine the character and nature of the various component parts is indeed a most difficult task.

Properties of Grease Lubricants

In general, greases should possess the following properties:

Viscosity or body to a degree sufficient to keep the surfaces from coming in contact under maximum pressure.

Fluidity to a degree consistent with the body. It being an essential condition for a perfect lubricant to possess that adhesive property which will reduce friction.

Melting Point not too high and a low temperature of solidification.

Freedom from tendency to decompose or oxidize by exposure to air, i. e., freedom from liability to gum or clog the bearing.

Freedom from foreign substances having a tendency to cut or corrode the metal of the bearings.

The average consumer, however, is not aware that greases are divided into two general types, animal (commercially known as tallow) and mineral. We will therefore consider first the mineral greases.

Mineral Grease

Under the heading of mineral greases may be included various consistent products which are made by forming a lime soap with slaked lime and horse fat and dissolving this soap in mineral oil. The general appearance and body of the final grease is greatly influenced by the kind of and amount of soap, the mineral oil and the process of manufacture. This type of grease usually has a very high melting point and from its very nature the coefficient of friction is necessarily high. Due to the presence of free fatty oils, there is bound to be decomposition and corrosion of the bearing will naturally follow.

There are also placed on the market from time to time, some so called lubricating greases compounded by unscrupulous manufacturers that are made by mixing heavy rosin with lighter petroleum oils. The viscosity or body of such compounds appear deceptively superior to some of the very best greases, but like all rosin oils, rosin and rosin oil mixtures, which form resinous deposits under the influence of frictional heat or exposure to the air, they are entirely unfit for lubricating purposes, gum up the machinery and retard the motion by their sticking propensities. Oftentimes poor grades of mineral oils and fats are used and fillers such as barytes, talc, soapstone or chalk introduced to give a better appearing body to the grease with the result that the bearings are in time pitted and scored. There also appears to be at the present time a general misconception of the use of graphite, the claims for which are best answered by J. R. Battle, B. Sc. in M. E., M. E. author of "Industrial Oil Engineering," wherein he states "Graphite is not a true lubricant, but tends only to fill in the hollows of plain bearing surfaces in order to allow the true lubricant to efficiently function."

Animal Greases

In coming to a consideration of the animal greases, which are commercially known as tallow greases, we find that the chemical composition of tallow varies somewhat and consists essentially of the two glycerides, olein and stearine, the latter predominating. When selected tallows are perfectly compounded and thoroughly boiled to a uniform consistency, the quality is superior to that of the very best mineral compounds. A good boiled grease is perfectly neutral and will remain so for an indefinite period of time. The principal component, tallow, in itself a lubricant, forms a carrier that is more readily applied to the rubbing surfaces. It is by the very nature of its application placed in such a position with regard to the bearing that the heat arising from the known element of friction melts the lubricant, which immediately runs on to the warm surface in the form of an oil which absorbs the frictional heat.

Due to the fact that their melting point is from fifty to seventy-five degrees lower, and that their coefficient of friction has been proven by authentic tests in the largest research laboratories to be considerably less than that of mineral greases, pure tallow compounds are greatly to be preferred, and thanks to their nature can be purchased in bulk with the assurance that they will not decompose nor turn rancid, no matter how long they may be stored. In comparison with a pure mineral grease like vaseline, tallow grease, possesses to a far greater degree the property of greasiness. The essential requirement, however, of a tallow grease is quality.

An executive who realizes that a machine may contain within itself both slow and high speeds, will readily appreciate the fact that the first cost of grease does not by any means end his lubrication problems. His requirements call for a lubricant absolutely free from impurities, always uniform in quality and having a comparatively low melting point. He is then assured that the lubricant will readily melt under any condition, in any climate and thus preserve a bearing which would be liable to score or seize where a high melting point grease is used.

There is not a successful executive today who is not keenly alive to the value of any method that can produce concrete results and whether it be tallow or mineral grease, actual service, economy of use, first cost, or final returns, grease lubrication, properly applied, can prevent the undesirable splashing of walls, ceilings and floors.

Tenth Annual Meeting of Canadian Paper Makers

THE convention of the Canadian Pulp and Paper Association was held at the Ritz-Carlton Hotel, Montreal, Canada, on January 24, 25 and 26, 1923.

Every session of this great meeting was pervaded with a genuine spirit of optimism for the future of the industry. And it cannot be said that this optimism was without foundation. Every indication is of a steady and sound growth in the industry. There were, of course, perplexities of varying importance brought up at the meetings. These were discussed and in most cases satisfactory solutions were arrived at, which merely goes to prove that a meeting of this nature has immediate commercial value, aside from its rewards of fellowship and good will.

Technical Section Meeting

At 10 A. M. Wednesday, January 24, the Technical Section of the Association met in the Ball Room of the Ritz-Carlton Hotel. Chairman O. F. Bryant opened the meeting by summarizing a few accomplishments of the Technical Section during the past year. Mr. E. A. Rees, director of research for F. C. Huyck & Sons gave a paper dealing with the "Function of Press Felts." In conclusion Mr. Rees said,

"The proper design of a felt to embody the desired properties of permeability to flow of water, cushion and softness as affecting concentration of nip pressure, is a problem requiring the closest of study and co-operation between felt-makers and paper-makers. The question of water-removal is becoming of increasing importance in paper-making and requires intensive research not only because of its relation to economy but it may also have a very direct bearing on the quality and formation of sheet."

The second session of this section met immediately after the luncheon, at which time Mr. E. J. Trimbey, of the Trimbey Machine Works, read his paper on "Stock Saving With and Without Save-Alls." Mr. Trimbey's paper will be found elsewhere in this issue.

The Thursday morning session included the reading of a very interesting paper on the "Manufacture of Ink and the Relation of Ink Properties to the Printing of Paper of All Grades." This was read by Mr. B. G. Ransom of the Ault & Wiborg Company. Among other things Mr. Ransom said,

"Another trouble the ink man has is that paper will vary in thickness, running all the way from 28 lb. stock to 32 lb. stock. In some instances you will find this in the one roll, and you can readily see where, if a printing press has its impressions set for 32 lb. stock and it runs into some 28 lb. stock, the ink will only kiss on instead of being pounded in by impression, and will leave a smeary dirty sheet, blamed on the ink that is working all right on proper impressions."

Dr. Bjarne Johnsen of the Hammermill Paper Company also gave a paper on "The Properties of Wood in Making Paper," which paper is published elsewhere in this issue.

At a joint luncheon of the Technical and Woodlands Sections, held Thursday noon, a moving picture showing many tractor uses was shown. This picture was shown through courtesy of Mussens, Limited, of Montreal and the Lynn Tractor Company.

The last final meeting of the Technical Section was held Thursday afternoon at which time a paper on "The Utilization of Steam in a Modern News Print Mill" which was prepared jointly by Mr. Surrey Slater of the St. Maurice Paper Company, Limited, and Mr. J. E. Warner. In regard to the importance of this subject the authors of this paper say,

"In general, the importance of heat conservation has not been appreciated in this industry and, in view of the national movement to conserve natural resources, all newsprint paper mills are in duty bound to study their own particular problem, so that their coal or fuel-oil requirements may be reduced to a minimum. It is hoped, therefore, that this paper may be of assistance to those who, no longer content with operating by the rule of thumb, desire to analyze their heat load, in order to assist in conservation and to reduce the cost of manufacture."

Due to lack of time the paper which was to have been read by Mr. E. P. Cameron of the Forest Products Laboratories had to be omitted. This paper on "Recent Experiments in Pulp Testing" will, however, be found in a succeeding issue. Just before the close of the meeting officers for the ensuing year were elected and are as follows: Chairman, O. F. Bryant; vice-chairman, C. N. Gain; executive council comprised of, R. W. Hovey, C. V. S. Hawkins, and A. P. Costigane.

Canadian Pulp and Paper Association Meeting

The annual meeting of the Canadian Pulp and Paper Association opened at 10 A. M. Friday in the Vice Regal Suite of the Ritz-Carlton Hotel.

One of the important items of this meeting was the acceptance of the proposed amendment to by-law X, which now reads as follows:

Dues

The annual dues for members shall be based upon the actual quantity of products manufactured for sale and shall be assessed on the following basis:

On Mechanical Pulp, two cents per ton; on Chemical Pulp, three cents per ton; on News Print, Boards, Wrappings, Sheathing and Miscellaneous, four cents per ton; on Book Papers, Writing, Coated and Tissue Papers, five cents per ton; provided, that no member shall be assessed for an amount less than One Hundred Dollars per year.

Members located on the Pacific Coast shall be assessed on the basis of 50 per cent of the foregoing amounts.

Dues shall be payable quarterly in advance on the first day of January, April, July and October, respectively, in each year, and shall be assessed on the tonnage for the preceding quarter, as reported by the members to the Association.

The Executive Council shall have power to make special assessments upon members whenever such assessments are found to be necessary.

At this session Mr. Edward Beck, secretary, made a few remarks upon the achievements of the association during the past year.

At the noon luncheon Sir Edmund Walker, president of the Canadian Bank of Commerce gave a very enlightening talk on present financial situations which affect the paper industry.

Mr. S. E. Thomason vice president of the American Newspaper Publishers' Association and general manager of the Chicago Tribune in a well received address emphasized the importance of close co-operation between the paper mill and the newspaper. He termed the two as one industry.

Mr. Edmund Kent, elected as president for the coming year at the morning session is president of the Kinleith Paper Mills, Limited, St. Catharines, One. and vice president of the W. J. Gage & Company, Limited, Toronto, Ont.

The annual dinner of the Canadian Pulp and Paper Association was held Friday evening and was a very enjoyable and interesting event.

REPORTS OF COMMITTEES

Report of Education Committee

Your Committee in the year under review has kept in touch with developments in several lines of educational endeavor. These include existing educational provision in mill towns, work at universities calculated to attract science men into the industry, continued co-operation with the Joint Committee on textbooks and the activities of the Institute of Industrial and Domestic Arts, the name of the organization formed to carry on the work of correspondence instruction in the Manufacture of Pulp and Paper, as authorized by the Canadian Pulp and Paper Association.

Important educational work bearing on industry is being carried on by local agencies such as Mills, Advisory Industrial Committees, Y. M. C. A., Trade Councils and others. We would draw the attention of technical men in the industry in Ontario to a provision of the Ontario department of Technical Education, whereby instructors may be engaged by local school authorities, for special work such as draughting, chemistry, engineering, etc. These instructors are preferably drawn from local industries and are paid from $3.00 to $7.00 per night. This work provides a chance for technical men to add from $6.00 to $15.00 a week to their incomes during the winter. Some communities have no organized work of this kind as yet and so present an opportunity for development. The local authorities have the power to issue temporary certificates of qualification.

The work done in the universities is bearing good fruit.

Lectures have been delivered in the past two or three years at McGill, Toronto and Queens Universities by members of this committee and students have been employed in mills during vacations. One of the results is that university men may be found in many jobs in the mills from broke hustler up, and continuation of this method will introduce to industry a number of young men of the most ambitious type, prepared to serve in the lower paid jobs for the experience to be gained thereby. This movement to industry, of the university man willing to submit to a thorough practical training, will have an important bearing on the development of higher technical efficiency.

A useful body known as the Workers' Educational Association has been formed and is carrying on work in the larger centers, but can be organized in any community. Its object is not vocational education, but the preparation of its members for better citizenship, by giving instruction in economics, literature, history and art. It is supported by nominal membership fees and by contributions from labor unions, locals and trade councils, school boards, clubs, etc. The chairman of this committee will be glad to give further information about this important work, on request.

Members of this committee representing it on the joint committee on textbooks have kept in touch with Editor Stephenson, Secretary Kellogg, and the other members representing the T. A. P. P. I.

The first three volumes have met with a satisfactory reception from the industry generally. Very gratifying reviews have appeared in technical and scientific periodicals not only on this continent but in Europe, Volume III. being accepted as the best work on pulp yet published, and Volumes I. and III. have had to be reprinted to meet the demand.

The Status of Volume IV. in January 1923 was:

Section 1.—"Preparation of Rag and Other Fibres."	At printer's.
Section 2.—"Treatment of Waste Papers."	At printer's.
Section 3.—"Beating and Mixing."	Nearly revised, a little work more to prepare for printer, two more drawings needed.
Section 4.—"Engine Sizing and Loading."	At printer's.
Section 5.—"Coloring."	Ready, minus one table.
Section 6.—"Paper Making Machines."	Ready for author's revision.

For Volume V.—Manuscript largely in hand; much editorial work will be required and all men in the industry who are able to do so, must co-operate in giving information if certain sections are to be satisfoctory:

Section 1.—"Tubsizing and Finishing."	M.S. in hand, shipping is yet to be described.
Section 2.—"Hand Made Papers."	M.S. in hand.
Section 3.—"Special Papers, etc."	To be done.
Section 4.—"Paper Testing."	To be rewritten.
Section 5.—"Laboratory Practice."	In hand.
Section 6.—"Definitions of Papers."	In preparation.
Section 7.—"Water."	
Section 8.—"Steam Power and Electrical Equipment."	To be done.
Section 9.—"Instruments and Accessories."	To be done.
Section 10.—"Transmission of Power and Transportation of Material."	To be done.

At the last annual meeting of the Technical Section a proposition was placed before the Section by the Industrial and Educational Publishing Company to inaugurate and carry on a system of correspondence instruction based on the textbooks prepared by the industry. It was decided, following the report of a special committee on the question, to recommend that the Pulp and Paper Association approve the proposal and appoint a special committee of executives to supervise the work for the Association. This recommendation was adopted and such a committee appointed, consisting of Messrs. George Carruthers, F. J. Campbell and O. F. Bryant.

An organization known as the Institute of Industrial and Domestic Arts was formed to carry on this work, with Mr. J. J. Harpell as president and Mr. J. N. Stephenson as secretary. A syllabus of courses was prepared, copies of which in both French and English, are here for the use of interested members.

The department of pulp and paper making of this institute has a faculty comprising many of the best known men in all branches of the industry in Canada and the United States, who have consented to act as instructors and referees in their special lines. Mr. J. N. Stephenson is principal, and Mr. J. J. Clark, formerly Dean of the International Correspondence Schools, is vice principal. Mr. T. L. Crossley is director of extension service and supervisor of education in English. Mr. P. E. Piché, B. A., is supervisor of education in French and translator, putting Volumes I. and II. of the text books into French. Volume I. has already been translated and the first study papers are in the hands of the students.

The first students were enrolled in June, thus inaugurating the first correspondence school of pulp and paper making. Active campaigning for students, by personal visits to the mills was commenced early in September in the Niagara Peninsula and St. Maurice Valley and has been continued since, by Messrs. Harpell, Piché and Crossley. A very gratifying reception has been met with in most of the mills visited and up to the present 150 students have been enrolled, most of these being entered for the complete pulp and paper course. Over 10 per cent of the students enrolled are university graduates.

A large part of the industry remains to be visited. We wish to point out that interest on the part of the men and success in obtaining students, has been in direct ratio to the attitude of co-operation met with at the plants.

We also point out that the industry as a whole is benefitted and better equipped for future developments by the carrying on of this work, and we therefore urge a cordial and active co-operation, not only when your several mills are visited, but at all times, by keeping the matter constantly before your men and by appropriate recognition of those who enroll and persevere in these courses. We especially urge the executives of the smaller mills to such line of action, because employees who are studying their work become more useful. Two or three ambitious, hard working men studying the industry might make the difference between success or failure in the operation of some mills and this fact should be well recognized.

The practical man of long experience, but of limited education, may become one of the most useful foremen or superintendents with the aid of a little knowledge of mathematics and physics, and the practice of putting his ideas in writing, as obtained in a correspondence course.

This work is only at its inception now. It is the second stage of a monumental work of enormous possible benefit to employer and employee, both directly and indirectly.

For these reasons we cannot too strongly emphasize the need for co-operation with the personnel of the Institute of Industrial and Domestic Arts, and for encouragement and help to the men who show their bona fides by putting hard earned money and time into the endeavor to widen their range of usefulness.

Indifference is the heart disease of industry and indifference is in very large measure due to ignorance.

By the co-operation of the various agencies now reported upon, there is no man in the Pulp and Paper industry, however illiterate, provided he can merely read and write, who need be without a good education in the principles upon which his daily work is based, and while we emphasize the advantage of this state of things to the industry we can also point out that such knowledge removes to a great extent the curse of drudgery, and brings appreciably nearer the day when men throughout our industry can say, with Henry Van Dyke,

"This is my work, my blessing, not my doom,
"Of all who live, I am the one by whom,
"This work can best be done in the right way."

Respectfully submitted,

George Carruthers,
A. P. Costigane,
C. Nelson Gain,
J. N. Stephenson,
T. L. Crossley (Chairman).

Report of Committee on Chemical and Physical Standards

The work of the committee has been entirely devoted to the development of a standard method of testing pulp for strength. A tentative outline of the points necessary to investigate in a complete study of this problem was drawn up and adopted by the committee as the basis of their working plans.

The work was divided into two sub-divisions namely, (1) Literature Study and (2) Experimental.

(1) Literature Study.—It was the feeling of the committee that a complete literature study of the subject would be most useful and would well repay the members for the work necessary for its compilation. An endeavor has been made therefore to carry this project through and the compilation will appear, in its first form, at the January meeting.

(2) Experimental.—The experimental work has been devoted to the determination of the variables affecting the strength of the test sheet after its formation and in particular that of pressing. The fundamental curves for strength in relation to:—pressure applied, ream weight, moisture content at time of pressing and duration of load have been established for unbeaten sulphite pulp. A thorough study of the methods used in carrying out these tests has been made and will be put before the members of the section for criticisms and suggestions.

A similar study of Kraft, groundwood and soda pulps will be undertaken and the necessary duplication of the work for beaten pulps during the coming year.

Respectfully submitted,

E. P. Cameron, Chairman.

Report of the Committee on Abstracts and Publications

During the past year your committee provided for 140 pages of abstracts of current articles which were published in the Pulp and Paper Magazine and paid for by that journal. These pages have been reprinted as a bulletin of the Technical Section and distributed to members through the secretary's office. An index of the abstracts is in preparation.

It has been suggested that instead of reprinting the abstracts in full shortly after publication in the magazine, it might be better in the end to hold merely the first three or four lines indicating the title of the article and the place where it appeared, then to collect these at long intervals, according to subject, once or twice a year, and reprint what would be an index of the year in this form. The opinion of the Section is awaited by your committee as to what should be done in this respect.

At the beginning of the New Year, the chairmanship of the Abstract Committee of the Technical Association of the Pulp and Paper Industry, was taken over by Mr. Charles J. West, leaving Mr. Ross Campbell with more time to devote to his work as chairman of the Dyestuff Committee. We wish to express at this time our deep appreciation of the cordial co-operation and ready assistance of Mr. Campbell during the several years of his chairmanship. The handling of the abstracts will continue to be carried on co-operatively as has been done in the past.

The chairman had the pleasure of meeting Mr. Arthur Baker of Greenhithe, England, the first chairman of the British Technical Section, and as a result of conferences it seems probable that the British Technical Section will join with the Technical Association and our own Section in the matter of abstracts.

The abstract program of the T. A. P. P. I. will be curtailed slightly by the restriction of articles dealing with engineering matters and with the forestry. Your committee however, feeling the great importance of forestry matters to the Technical Section and to the Woodlands Section, have decided to continue this service and have arranged with the Pulp and Paper Magazine to publish abstracts of articles dealing with forestry under the department entitled "With the Woodsmen."

Bound copies of the abstracts for 1922 can be had from the Pulp and Paper Magazine at $2.50 per volume.

There are now ready for distribution copies of the "Transaction and Proceedings of the Technical Section for 1922." This volume contains papers, reports, and discussions presented at the annual meeting last January and a brief account of the summer meeting of the Technical Section at the Abitibi Power & Paper Company, Ont. It includes also the by-laws and a biographical list of members of the Section. This list of members is not up to the minute but will be kept revised from now on, as the committee has under consideration the preparation of a semi-annual volume.

Respectfully submitted,

J. N. Stephenson, Chairman.

Attendance

Among those present were:

J. Arthur Allen, Paper Sales, Ltd.. Toronto.
W. A. Anderson, Kinleith Paper Mills, Ltd., St. Catharines, Ontario.
A. T. Anderberg, Paper Sales Ltd., Canada, Cement Bldg., Montreal.
H. Anvik, Riordon Company, Temiskaming, Quebec.
W. S. Barber, Provincial Paper Mills. Toronto.
Dr. Charles Bay, Riordon Company, Hawkesbury, Ontario.
B. A. Chandler, Oxford Paper Company, St. John, N. B.
J. S. Bates, Bathurst Company, Bathurst, N. B.
W. E. Brawn, Pejepscot Paper Company, Brunswick, Maine.
Geo. D. Bearce, News Print Service Bureau, New York, N. Y.
Alex. Beique, Canada Paper Company, Windsor Mills, Quebec.
A. O. Bownes, E. B. Eddy Company, Hull.
B. Branch, Canada Barking Drum Company, Toronto.
O. F. Bryant, Laurentide Company, Ltd., Grand Mere.
E. A. Bradshaw, Bradshaws, Ltd., Toronto.
F. J. Campbell, Canada Paper Company, Ltd., Windsor Mills, Quebec.
E. P. Cameron, Forest Products Laboratories, Montreal.
Ross Campbell, Procter & Gamble Company.
J. Harry Campbell, McGill.
W. B. Campbell, Provincial Paper Mills, Georgetown, Ont.
Geo. Carruthers, Interlake Tissue Mills, Ltd., Toronto.
O. T. Chalon, 176 West 81st Street, New York.
F. W. Clarke, Gulf Company, Quebec.
A. B. Copping, DeGrasse Paper Company, Pyrites, N. Y.
John Cornell, Paper Mill, New York.
A. P. Costigane, Ontario Pulp and Paper Makers Safety Association, Toronto.
David Crabtree, Howard Smith Paper Mills, Beauharnois, Que.
A. L. Dawe, Canada Export Paper Company, Ltd., Montreal.
H. J. Daubney, Kenwood Mills, Arnprior, Ont.
A. Davis, Riordon Company, Temiskaming.
F. E. Davis, Beaver Board Company, Buffalo, N. Y.
Gerhard DeGeer, Riordon Company.
A. G. Durgin, Spanish River Pulp and Paper Mills, Sault Ste. Marie.
Charles E. Ellis, Downingtown Manufacturing Company, Downingtown, Penn.
C. D. Goodwin, La Tuque, Quebec.
C. R. Hazen, Milton Hersey Company, Montreal.
J. J. Harpell, Gardenvale, Quebec.
F. T. Harris, International Paper Company, New York.
C. S. V. Hawkins, Price Bros., Kenogami, Quebec.
L. S. Henry, DeGrosse Paper Company, Pyrites, N. Y.
John Hewitt, Jr., Paper Sales, Ltd., Toronto.
F. R. Hyatt, International Paper Company, Glens Falls, N. Y.
B. Johnsen, Hammermill Paper Company, Erie, Pa.
C. D. Jentz, St. Maurice Paper Company, Cap Madeleine, Quebec.
F. H. Johnson, Smoothrock Falls, Ontario.
Harry Kaya, Price Bros., Quebec.
F. Kay, Kudroll Peckharat Company, 275 St. Paul Street, Montreal.
Geo. D. Kilberry, Downingtown Manufacturing Company, East Downingtown, Pa.
H. O. Keay, Laurentide Company, Grand Mere, Quebec.
S. E. Kay, DeGrosse Paper Company, Pyrites, N. Y.
T. J. Keenan, T. A. P. P. I., New York.
R. S. Kellogg, News Press Service Bureau, New York.
H. F. E. E. Kent, Toronto.
K. T. King, Ed. DuPont de Nemours Company, Chicago.
H. N. Lee, Hammermill Paper Company, Erie, Pa.
W. S. Lucey, Hammermill Paper Company, Erie, Pa.
Maurice London, Lagerloef Trading Company, New York.
Wm. C. Lodge, Forest Products Laboratories, Montreal, Quebec.
A. T. MacIntyre, Canada Paper Company, Windsor Mills, Quebec.
A. E. Macafee, Babcock & Wilcox Company, Ltd., St. Henry.
J. O. Mason, Laurentide, Grand Mere, Quebec.
A. E. G. Madley, Hydraulic Machinery Company, Montreal.
Ralph Mead, Sanford Riley Stoker Company, Worcester, Mass.
Arthur Y. Meeker, Alberene Stone Company, New York.
C. R. Mereweather, Eddy Company, Hull.
Geo. Mitchell, Ayers, Ltd., Lachute.
W. G. Mitchell, Price Bros., Kenogami.
W. D. Mosher, Belgo Paper, Shawwinigan Falls.
O. H. Moore, Hinde & Dauch Paper Company, Toronto.
C. A. Moyle, Riordon Company.
T. J. Mullen, Belgo Paper Company, Shawinigan Falls, Quebec.
Wm. C. Munro, McGill.
W. G. MacNaughton, T. A. P. P. I., New York.
A. G. Natwick, Lincoln Mills, Ltd., Merritton.
E. Piché, Gardenvale, Quebec.
O. M. Porter, A. P. and P. A., New York.
R. W. Pryer, Jr., Koithan & Pryor, New York.
J. C. Quinn, Butler Paper Company, New York.
Wm. H. Rose, Canadian Combustion Company, Toronto, Ontario.
E. A. Rees, F. C. Huyck & Sons, Albany, N. Y.
B. C. Root, Hydraulic Machinery Company, Montreal.

A. J. Sigel, M. Gottesman & Co., New York.
Wm. G. Self, Canadian Combustion Company, Toronto.
Howard Scott, Paper Industry, Chicago.
W. B. Scott, Grand Mere, Quebec.
L. H. Shipman, Spanish River Pulp and Paper Mills, Sault Ste. Marie.
J. N. Stephenson, Gardenvale, Quebec.
L. M. Smith, Brompton Company, East Angus, Quebec.
F. X. Trudel, Belgo Paper Company, Shawinigan Falls, Quebec.
O. A. Wales, Johaneson, Wales & Sparre, Inc., New York.
S. Wang, Riordan Company, Hawkesbury, Ontario.
N. E. Wainwright, Provincial Paper Mills, Toronto.
R. B. Wardle, Laurentide Company, Grand Mere, Quebec.
W. W. Weed, Kenwood Mills, Ltd., Arnprior, Ontario.
G. E. Williamson, Strathmore Paper Company, Mittineague.
E. J. Wilson, F. C. Huyck & Sons, Albany, N. Y.
Ed. Wright, Hugh Falls Paper Company, Chateaugay, N. Y.
C. C. Young, Pejepscot Paper Company, Brunswick, Maine.
J. C. Yule, Kenwood Mills, Ltd., Arnprior, Ontario.
P. L. Colbert, Valleyfield Coated Paper Mills, Valleyfield, Quebec.
F. M. H. Cushing, Provincial Company, Thorold, Ontario.
T. L. Dunbar, Stebbius English Company, Watertown, N. Y.
S. J. Fisher, E. B. Eddy Company, Hull.
R. B. Foulis, Provincial Paper Mills, Goergetown, Ontario.
D. S. Gottesman, Gottesman & Co., Inc., New York.
F. W. Hume, National Publishers' Association, New York.
H. A. Owen, Canadian General Electric Company, Toronto.
C. G. Arbo, Lachine, Quebec.
J. V. Baron, Sherman Paper Company, Watertown, N. Y.
G. A. Davidson, Howard Smith Paper Mills, Montreal.
John M. Finlay, Ritchie & Ramsey, Ltd., Toronto.
A. Jewett, Provincial Paper Mills, Montreal.
F. W. McCrea, 253 Sherbrooke street, West, (Student).
Louis W. Michael, Donnacona Paper Company, Donnacona, Quebec.
John H. O'Connell, A. P. and P. M. Superintendents' Association, Kalamazoo, Mich.
W. J. Parks, Interlake Tissue Mills, Merritton, Ontario.
Geo. W. Pauline, Ritchie & Ramsey, Ltd., Toronto.
Pounsford, Provincial Paper Mills, Ltd., Port Arthur, Ontario.
A. E. Quaal, Donnacona Paper Company, Donnacona, Quebec.
John D. Rue, Forest Products Laboratories, Madison, Wis.
R. C. H. Sewell, Donnacona Paper Company, Donnacona, Quebec.
F. T. E. Sisson, Racquette River Paper Company, Potsdam, N. Y.
E. B. Slack, Howard Smith Paper Mills, Cornwall, Ontario.
T. P. Wilder, Diana Paper Company, Harrisville, N. Y.

Woodlands Section Meeting

The annual meeting of the Woodlands Section of the Canadian Pulp and Paper Association was an all-day affair Thursday. At this meeting there was a lively discussion on the "Progress of Research Work in Forestry in Canada." This was led by Ellwood Wilson of the Laurentide Paper Company. Following this discussion a paper was presented by L. W. Campbell, Chief Accountant of the Laurentide Company, dealing with the subject of "Progress in Cost Accounting for Logging Operations." Mr. Campbell's paper is given elsewhere in this issue. The afternoon session was marked by a discussion on "How Far Can the Pulp Mill Go in Utilizing Decayed, Insect Killed or Other Inferior Wood in the Manufacture of Paper?"

News Print Service Bureau Meeting

At the annual meeting of the News Print Service Bureau, held at the Ritz-Carlton Hotel Friday, Geo. M. McKee of the Algonquin Paper Corporation, Ogdensburg, N. Y., was elected president. Other officers are as follows: vice president, Louis Bloch of the Crown-Willamette Paper Company, San Francisco, Cal.; secretary-treasurer, R. S. Kellogg, New York; executive committee, P. B. Wilson, of the Spanish River Pulp and Paper Mills, Sault Ste. Marie, Ont., W. E. Haskell of the International Paper Company, New York City, and J. L. Apedail of Price Brothers & Company, Quebec.

According to reports the Bureau is in an excellent financial condition.

The newly organized Conewago Felt & Paper Co. is completing plans for the construction of its initial unit at York Haven. Hamme & Whitman, City Bank Bldg., York Pa., are the architects.

The Properties of Wood in Paper Making*

By BJARNE JOHNSEN and H. N. LEE

THE suitability of any kind of wood for paper making is determined by its physical and chemical characteristics. Very resinous woods, like the pines, are not suitable for the sulphite process but make an excellent raw material for the sulphate or Kraft process. Soda pulp from poplar is used in certain papers such as book papers on account of the short, bulky fibre, but can not be used for papers where strength is required. It is not the intention of this paper to discuss the value of the various species of wood for all different pulping processes and for the different grades of paper. This discussion will deal chiefly with the most important pulpwoods, spruce and balsam, and their use in the sulphite process, which is by far the most important chemical process. However, much of data given can be equally well applied to other woods and the other processes.

In discussing the properties of wood for paper making there are two chief considerations, economy and quality. Wood is ordinarily purchased on the cord basis and the consumption of wood is recorded on the cord basis. It is customary to express the yield of pulp in terms of cords used per ton of pulp, but while the enormous variations in this figure in different mills may, to a great extent, be accounted for in the different methods used in the manufacturing process, it is not possible to so explain the great variations which are experienced in any one mill. These variations can be explained only when the actual value of the cord based on the physical and chemical properties of the wood are known.

Measurement of Cord Wood

Considering first the physical properties, it is known that a very large variation can exist in the amount of solid wood in the cord. According to Sterns[1] the theoretical solid content of the cord is always the same provided the logs are all of the same diameter. In this case the theoretical solid content is 90.69 per cent (116.1 cu. ft.). If the logs differ in diameter the solid content will be greater and will increase as the ratio of the largest diameter to the smallest increases.[2] However, in actual measurements he found no cord contained over 80 per cent (102.4 cu. ft.) solid wood.

Graves (2) and Thalen (3) give the following figures:
Cubic Feet per Cord

	Graves		Winslow and Thalen			
Length	Over 5.5 at Small inch dia. End	2.5 to 5.5 at Small inch dia. End	Mixed	Straight	Crooked	Knotty
30 in.	90.5	83.9	87.2	..	..	..
4 ft.	88.9	82.4	85.7	92	82	74
8 ft.	83.8	77.2	80.5	82	75	50

Sterns found the average solid volume per cord of 32-inch wood, based on careful volumetric measurement of 34 cords, logs from 4-inch to 16-inch diameter to be, before barking, 93.97 cu. ft., after barking, 83.36 cu. ft.

Our own measurements on two very different kinds of wood, one coming from northeastern Quebec and the other from Minnesota, based on 32 cords of each class of wood, are as follows:

No. of logs per cord.	67	115	102	156	36	86
Ave. diam. inches per cord	7.31	5.67	10.56	6.50	5.96	4.95
Cu. ft. solid material per cord	88.58	85.68	99.52	91.72	69.79	77.82

The Quebec wood was peeled, the Minnesota wood was not peeled, therefore the actual wood in the latter was about 12.5 per cent less or an average of about 75 cu. ft. per cord. The greatest variation in the amount of solid wood was due to poor packing which in turn was frequently due to crooked or poorly trimmed logs. The figures appear to show conclusively that wood of larger average diameter, which means a mixture of small, medium and large diameters, results in more actual solid wood per cord than wood of small average diameter.

In most cases investigators have found that the larger the average diameter the greater the solid content but Sterns found just the reverse. He believes the discrepancy may be explained by the fact that he measured 32-inch wood while the others, in general, measured 4-foot or 8-foot wood. It is certainly true that the effect of crookedness of logs is greater in long logs than in short ones and it is possible that in very short logs the effect of crookedness might be comparatively small. Moreover, large diameter logs are more likely to be straight than are those of small diameter.

*Paper read before the Technical Section of the Canadian Pulp and Paper Association held at Montreal, January 24 and 25, 1923.

It has been shown in the foregoing that the actual value of a cord of wood for production of pulp, or in other words the solid wood in a cord, may be influenced by several factors and may vary considerably. To secure reliable figures from which to determine yield, as well as to handle the purchase of wood in the most efficient manner, it is quite apparent that accurate measurement of the wood is necessary.

Density and Rate of Growth

The value of a given volume of solid wood for pulp is determined by the dry weight of the wood. This is dependent on the density of the wood. This varies, not only with the species but also within the same species according to the conditions of growth.

Our investigations show that in balsam as well as in spruce, and the same may probably be applied to other coniferous woods, that slow growth wood is more dense than rapid growth wood. The following are figures for logs 6 inches in diameter:

	Rings per Inch	Weight cu. ft. Green Wood When Absolutely Dried
Quebec Spruce	18.5	27.6
	4.5	20.2
Minnesota Spruce	17.4	28.0
	5.7	22.4
Quebec Balsam	19.7	27.2
	4.3	18.7
Minnesota Balsam	10.3	22.6
	6.4	17.8

Moreover, as is shown in the following table by Kress, Wells and Edwards,[4] there is considerable variation in the average density of different species of wood.

	Ave. Weight of 1 cu. ft. of Green Wood When Dried
Black Spruce (Picea mariana)	23
White Spruce (Picea canadensis)	24
Balsam Fir (Abies balsamea)	21
Hemlock (Tsuga canadensis)	24
Jack Pine (Pinus divaricata)	24
Aspen (Populus tremuloides)	23

Our own tests show:

	Ave. Wt. of 1 cu. ft. of Green Wood When Dried	Ave. Rings per Inch
N. E. Quebec Spruce	25.2	12.8
S. W. Ontario Spruce	25.6	11.5
N. E. Quebec Balsam	20.8	9.1
S. W. Ontario Balsam	20.4	8.2

From this data it is apparent that spruce has, on the average, 15 to 20 per cent greater density than balsam fir. Here again, as in the case of cord wood measure, are opportunities for large variations in the possible yields from cords of wood composed of more than one species or even composed of the same species of different rates of growths.

Chemical Composition (Cellulose Content)

Another factor which influences the possible yield, even when the foregoing factors are eliminated, is the chemical composition of the wood. The most important characteristic is the cellulose content. The data on this subject from different sources are not always comparable because the various investigators have not used the same methods in making their determinations. The relative cellulose content of certain kinds of wood, based on a comparatively small number of tests is given by Johnson and Hovey.

Cellulose calculated as per cent of oven dry wood

White spruce	56.48
Black spruce	50.64
Red spruce	52.95
Balsam fir	51.60
Jack pine	49.24
Hemlock	48.70
Aspen	57.25

Even within the same species it has been shown that the cellulose content varies. Johnsen and Hovey found in balsam fir that rapid growth (low density) wood contained 50.35 per cent cellulose while slow growth (high density) wood contained 52.85 per cent cellulose. Thorbjornson[5] gives the following figures for Swedish spruce, determined from different parts of the same log:

Specific Gravity	*Per Cent Cellulose*
.382	53.4
.425	57.3
.446	58.5

As far as the two most important pulpwoods, spruce and balsam fir, are concerned it is safe to say that spruce has a slightly higher cellulose content than balsam fir. According to this data the yield which may be expected from a given volume of solid wood will be greater with woods of high density for two reasons, (1) the greater actual weight of wood substance, (2) the somewhat greater cellulose content by weight.

Decay

The influence of the cellulose content on yield is much more marked when wood of different degrees of soundness are compared. It has been found by Acree[7] that the cellulose content may be decreased by as much as 28 per cent. Similar results have been obtained by J. L. Parsons[8] (unpublished data). While in general decay decreases the cellulose content, Parsons found that decay caused by Trametes pini Brot. resulted in an increase in cellulose content of 15 per cent with a decrease in lignin of 30 per cent.

Another serious result of decay is a decrease in the density of the wood. Sutermeister[9] found spruce wood which was thoroughly affected by rot but which was still quite hard and firm weighed less than 18 pounds per cubic foot of dry wood while sound spruce weighed more than 22 pounds.

Relation to the Manufacturing Process

So far factors which have a bearing upon the value of the cord, particularly with regard to economy, have been considered. In the following the importance which knowledge of these factors and other factors have in the manufacturing process and on the final product will be discussed.

It is obvious that the variations in the solid content of the cord, due to the conditions of piling of wood, dimensions of logs, crookedness, and trimming, have a very great effect on the cost of production. However, these variations are eliminated as soon as the wood is in form of chips and therefore do not directly affect the capacity of the mill or the quality of the product.

Knowledge of the density of the wood is of much greater importance because it directly affects the yield and, as a result, the economy in several ways.

(1) Dense wood gives a greater weight of wood per cord.
(2) Dense wood gives a slightly higher cellulose content per unit of weight.
(3) Dense wood increases the digester capacity which allows a longer cooking time at lower temperature resulting in increased yield and a better quality of product.

These points are illustrated by the results obtained by experimental cooks on a semi-commercial scale as follows:

	Balsam	*Spruce*
Wt. of absolutely dry chips from cord of peeled wood, pounds	2036	2580
Wt. of chips in digester, absolutely dry, pounds	268	323
Bleach consumption, per cent	17.2	15.5
Yield of bleached pulp, per cent dry wood used	42.79	43.65
Yield bleached pulp for equal volume digester charges, pounds	115	141
Absolutely dry pulp per cord peeled wood, pounds	871	1126

Actual mill data, using two different classes of wood (average figures per month), show the following:

	Month A	*Month B*
Wt. cu. ft. wet chips when absolutely dried—pounds	8.15	8.64
Absolutely dry pulp per cu. ft. digester space—pounds	3.56	3.91
Yield absolutely dry pulp, per cent of dry wood	43.7	45.2
Screenings (dry) per cent of total pulp	3.00	2.03
Cooking time—hours	12	12.5
Bleach Consumption, per cent	12.7	12.0
Slowness of unbleached pulp	31.0	27.1
Strength of unbleached pulp	92	93

These experimental and mill data show how the density of the wood affects the value of a cord and the capacity of the cooking equipment.

Another factor which affects the digester capacity is the moisture content of the chips. The higher the moisture content of the chips, the heavier the chips will be and consequently the better will the chips pack in the digester. Thorbjornson has shown that by using chips with an average moisture content of about 20 per cent in place of chips with a moisture content of about 40 per cent the capacity of the digester is reduced 9.5 per cent.

It has already been stated that the variation in cellulose content with sound wood is not great but when rotten wood is used the cellulose content becomes a very important factor. The yield by weight, based on a number of experimental cooks, with the soda process, is shown by Sutermeister [9] to be about 30 per cent for rotten poplar wood as compared with

about 41 per cent for sound poplar. For birch an even greater reduction in yield was found. Sutermeister [9] using the sulphite process with spruce wood shows that the yield by weight is higher with rotten wood than with sound wood, but his conclusions do not seem entirely justified when it is considered that the two resulting pulps were not cooked down to any where near the same degree of purity; the sound wood yielding a pulp with only 0.6 per cent screenings and requiring only 17 per cent bleach while the pulp resulting from the rotten wood had 6.6 per cent screenings and required over 30 per cent bleach. There is no reason to believe that decayed wood should give a higher yield by weight than sound wood, except in cases where the fungus has caused an increase in the cellulose content, as referred to in the case of Trametes pini Brot. mentioned previously. This shows how necessary it is in investigations of this kind to specify the kind of fungus which has caused the decay of the wood, and also to compare resulting pulps on the basis of the same degree of purity. All of our experimental and mill data have shown a decided decrease in yield by weight when rotton wood is used. Also Bates [11] found a reduction in yield by weight in large scale experiments.

Large mechanical losses will occur if wood is decayed. Kress [13] gives the following figures for loss in chippings:

	Percentage loss in Screening ⅝" Chips
Nearly sound white spruce	5.62
Infected white spruce	13.22
Infected white spruce	15.60
Badly rotted white spruce	17.02

If wood is decayed, and especially if it is saprotten, a considerable loss occurs also in barking.

The effect of decayed wood upon the quality of the pulp is not clearly evident in Sutermeister's and Bates' reports. According to Bates there is no reduction in the strength of the pulp but his tests were made on unbeaten pulp and the difference would hardly show up at this stage, particularly when the wood is only partially decayed. Sutermeister [9] found a decided decrease in strength of pulp in the case of the rotten wood cooked by the sulphite process. With the soda process he found an increase in the strength of pulp from partly decayed birch wood, after beating in pebble mill, while he found it impossible to make sheets of beaten soda pulp obtained from very rotten wood. Our own tests show that decayed wood has a decided influence on the beating quality as well as on the strength of the resulting pulp. Pulp obtained from rotten wood hydrates more rapidly when beaten, and with the hydration the strength increases. However, the maximum strength of the pulp is reached at an earlier stage in the beating process after which point the strength decreases rapidly.

Such has been found to be the case, not only in experimental tests, but also in ordinary mill experience. Monthly figures from mill operation show that when a large percentage of wood was used which had been stored for two or three years, and therefore was more or less affected by fungus, the strength of the pulp was considerably lower and the slowness considerably higher than when comparatively new, sound wood which came from the same locality was used. This was the case in spite of the fact that the cooking process was adjusted so as to protect the fiber of the more or less decayed wood as much as possible.

The deleterious effect of decayed wood used in the groundwood process has been thoroughly investigated and described by Kress, Humphreys and Richards[12] and Bates[14].

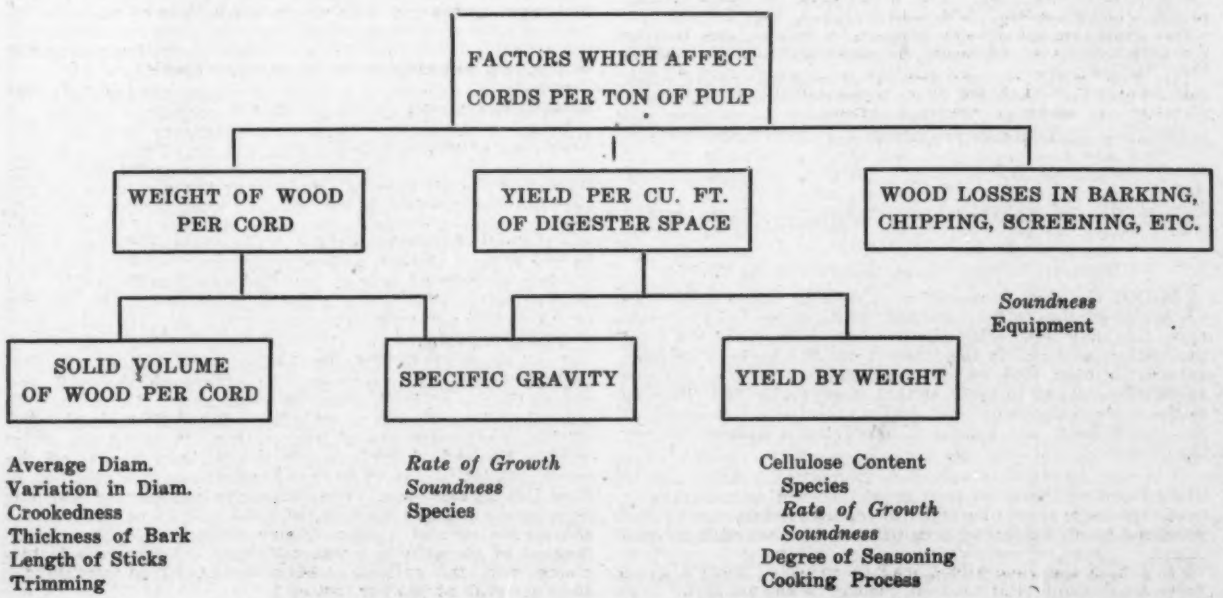
Seasoning

With a raw material which may be stored for a long period before it is used in the manufacturing process, it is of interest to know what effect seasoning has upon its value. It is evident that if wood is stored so that it will deteriorate from decay its value will gradually decrease. If, however, wood is stored under proper conditions, unfavorable for the growth of fungi and so that the wood may dry out, its value for pulp will increase. As Schwalbe[15] has stated greenwood, because it is less resistant to the cooking process, gives a lower yield than seasoned wood, but he has found it possible to materially increase the yield from green-wood by giving it a milder treatment. It has also been found in mill operation that seasoned wood gives a higher yield and a stronger fiber than greenwood. During the period of storage, the moisture content of the wood decreases which is an advantage since the moisture in the chips results in a direct dilution of the cooking liquor. However, if the wood is too dry, the penetration of the acid is much slower and more time is required to bring the digester up to the desired temperature and pressure, necessitating either a longer total cooking time or a higher temperature. Schwalbe found that the penetration of very dry wood could be materially decreased by pretreating the chips with steam or with waste liquor.

Another objection to the use of green wood is the difficulty which is experienced in the manufacturing process due to pitch. It is generally known that the troublesome pitch forming substances in the wood decrease during storage.

In the following diagram are shown the principal factors which influence the consumption of wood per ton of pulp or the yield of pulp per cord. The most important of these factors, density and soundness, are also the factors which influence the quality the most. In most cases the low density wood and the infected wood are cooked in mixture with sound wood of high density and the cooking process is adjusted to the sound wood. All the undesirable effects of low density wood and decayed wood are therefore experienced; low yield, low strength and high slowness. If, however, the wood could be sorted according to its qualities, soundness, density, seasoning, etc., it would be possible to adjust the cooking process to some extent for the various grades. In order to maintain the production of the mill with low density wood and with decayed wood it is necessary to shorten the cooking time by using a higher temperature. But especially with this kind of wood high temperatures should be avoided.

It is, in many cases, possible to do so by shortening the



penetration period of the cooking process, because wood of low density and decayed wood are more rapidly penetrated by the acid. A few experiments were made in order to determine how the penetration is affected by these factors. The results, which were obtained by placing discs of wood in a small digester with cooking acid of 6.18 per cent total SO_2 and 1.03 per cent combined SO_2, and bringing the temperature gradually up to 100° C. in 2½ hours, by keeping the temperature at this point for ½ hour, gives an indication of the comparative penetrability.

Penetration Ratio Based on Slow Growth Spruce Equal to 100

	Rings per Inch	Wt. per Cu. Ft.	Penetration Ratio
Slow Spruce	23	28.6	100
Rapid "	9	23.2	180
Slow Balsam	33	22.2	215
Rapid "	7	18.6	350
Spruce partly decayed..... *Lenzites sepiaria*	..	22.0	900
Spruce badly decayed..... *Trametes pini*	..	14.0	1,500

The question of proper methods of storing pulpwood has often been discussed. It will only be mentioned here that best seasoning conditions allowing a minimum amount of decay are secured when logs are peeled or barked and then stored in such a way that good circulation of air is always maintained throughout the piles.

It has been attempted in this discussion to point out some of the important factors which influence the economy and quality in the production of pulp and paper from wood, with the object of drawing more attention to this most important raw material. It is hoped that the pointing out of the factors which so greatly influence yield and quality will result in the establishment of methods of measuring and testing wood which will be of great value in the intelligent purchase and handling of wood and which will explain variations in yield and quality that, up to the present time, have not been fully accounted for.

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(2) H. S. Graves, "Forest Mensuration," John Wiley & Sons, New York.
(3) Winslow & Thalen, "The Purchase of Pulpwood," Paper, October 4, 1916.
(4) Kress, Wells & Edwards, "The Suitability of Various Species of American Woods for Pulp and Paper Production," Paper, Vol. 24, 914-22, 1919.
(5) Johnson and Hovey, "The Estimation of Cellulose in Wood," Pulp and Paper Magazine, Jan. 31, 1918.
(6) B. Thorbjornson, "Nagra synpunkter beträffande sulfitkokning," (Some Observations Regarding Sulphite Cooking), Svensk Pap. Tid. p. 196, 1922.
(7) S. F. Acree, "Destruction of Wood and Pulp by Fungi and Bacteria," Pulp and Paper Magazine, July 17, 1918.
(8) J. L. Parsons, Unpublished data, Hammermill Paper Co., U. S. A.
(9) E. Sutermeister, "The Use of Rotten and Stained Wood for Making Sulphite Pulp," Pulp and Paper Magazine, June 22, 1922.
(10) E. Sutermeister, "Decay of Pulp Wood and Its Effect in the Soda Process," Pulp and Paper Magazine, July 14, 1921.
(11) J. S. Bates, "Sulphite Tests of Average Wood, Infected Wood and Chipper Sawdust," Pulp and Paper Magazine, June 9, 1921.
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(13) Kress, Humphrey and Richards, "Some Observations of the Deterioration of Wood and Wood Pulps," Paper Industry, October, 1919.
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Stock Saving—With and Without Save-Alls*

By E. J. TRIMBEY
Trimbey Machine Works, Glens Falls, N. Y.

AMONG the stock losses of a paper mill is the good fibre which escapes in the so-called "white water." In extreme cases this may amount to ten per cent or more of the total production, and unlike the losses from the barkers or from screenings, it is more or less disguised and hidden, and due to its dilution and to the fact that it generally finds its way to the river through covered drains or sewers, the extent of the losses from this source is many times unsuspected by the owners.

It is easy to say that valuable raw material should not be wasted and at the same time it would seem unnecessary to urge that steps should be taken to reduce losses to the lowest practical point, but many times it has been difficult to convince the owners that these losses existed or could be reduced at small expense. When approached on this subject an elderly president once told the writer: "Young man! I was making paper before you were born! How can you come into my mill and show ME how to save stock?"

Mrs. Brown may admit that Willie Jones is a bad boy but she knows that her Johnny has none of his bad habits. In the same way, any superintendent will admit that there are white water losses in the industry as a whole, and he's certain that his friends up the river are wasting tons of good stock—he knows this because it plugs up his filters. He probable doesn't know what comes to the filters of the mills downstream and with deepest sincerity will assure you that nothing of that sort occurs in HIS mill, he knows what to do, and besides he is fully equipped with save-alls—and lulled into false security by the name he does not check up their operation or make a survey of the sewers to find out how much good fibre is going through them into the river. Had these machines been called "Save-Forty-Per-Centers" rather than "Save-ALLS" more attention might be given to the richness of the white water going to them. Then, too, as is so often the case, Save-alls once installed are more or less forgotten by the mill owners. The logical location for a Save-all from the standpoint of power consumption is in the basement where its supply can come by gravity, and the old adage "out of sight, out of mind" applies to Save-alls as well as to persons. While their continuous and efficient operation is necessary for the economical operation of the mill it is not necessary for the running of the paper machine; if it was, and if when the belt ran off, or the wire facing tore off, the paper machine should stop they would receive more careful attention than they generally do.

We do not wish to criticize Save-alls or their use, for they have their place and a very important one in the economical operation of every pulp and paper mill; but there are other and better ways of meeting the "white water" problem than by the indiscriminate use of Save-alls. They should be considered as watch-dogs guarding against the loss of stock, and when the Save-all is rolling off a thick sheet of pulp, instead of regarding this as an indicator of efficient mill operation it should be taken as a signal that somewhere back in the stock handling system leakage and loss are occurring; for, as a rule, high efficiency of the Save-alls means low efficiency of the white water and stock handling systems in the mill.

In most mills water costs nothing except for pumping or comes from a gravity supply. Plenty of fresh water is needed, but generally more than a plenty is used. A stock handling system is after all like a pint cup, it holds so much and no more. The tanks are larger than pint cups, to be sure, but sooner or later they become full and then, for every gallon of fresh water that is added to the system, a gallon of water must leave the system, and in leaving takes its toll in the form of filler or fibres.

No wire covered Save-all and no settling tank removes all the stock from the water coming to it, especially in the case of the larger newsprint mills where the volume of water to be handled is so great and where the pulp supply is largely, if not entirely, in the form of "soft stock" requiring practically no thinning before going to the machine chest.

One way to attack the problem of reducing the white water losses is to take the mill as you find it, accept the volume and richness of the excess water as a necessary evil, choose a good type of Save-all, and install enough of them to handle the entire flow; but do not stop with the installation. See that they are all kept in repair, that the deckle straps are kept in place, the facings are changed when torn or worn out, and by frequent comparisons of the richness of their supply and their discharge, keep them at their best efficiency; it will be low enough at best, and you can never hope to eliminate the loss entirely as long as you find need for Save-alls. As long as water goes through the cylinder or out the settling tank overflow you may be assured it will take its toll of fibre and filler along with it.

Another way is to begin at the beginning, and use the proverbial "ounce of prevention." Go through the mill and reduce the use of fresh water to a minimum. Do not cripple operations by trying to carry this too far at first, simply shut off the unnecessary use of fresh water. It may seem easier to stick the end of the hose into the pit than to shut off the valve, but let us see what that hose stream will cost you in fibre loss in one year. The 50 gallons per minute which it adds means that an additional 72,000 gallons per day leaves the Save-alls, and a conservative estimate of the average amount of stock in this water leaving the Save-alls is two pounds per 1,000 gallons, or 144 pounds per day, worth about $500 per year at $25 per ton.

*Paper read before the Technical Section of the Canadian Pulp and Paper Association held at Montreal, January 24 and 25, 1923.

Isn't it worth while to shut off hose streams at $500 per year each? This looks too good to be true, but don't call it the harmless ravings of a man who never saw a Save-all or a white water sewer—try it for yourself; stick a healthy one-inch hose stream into a barrel and see if it doesn't fill it in about a minute; then filter an average sample of the water leaving your Save-alls and don't be surprised if instead of two pounds per 1,000 gallons it tests four or even six.

When you have reduced your fresh water to a minimum, the next step is to keep all unnecessary stock out of your white water system. For example, go through the pulp mill and test the discharge water from each thickener. This does not necessarily mean a chemical analysis of each sample. Have a supply of two-ounce bottles numbered to correspond to the numbers of the thickeners; fill each with the white water from its thickener and set them aside for an hour to settle. If the deckles or packing straps on any have slipped out of place at the bottom, if a wire facing is cracked, or if for any other cause stock is leaking into the white water compartment it is at once shown up by the increased amount of stock in the water from that particular machine, which can be shut down and repaired. Without this simple test it might have gone on unnoticed for several days as even very rich white water from one thickener would hardly be noticeable when mixed with a dozen or more which were all right. To be sure, the Save-alls, if kept in good repair, would have caught part of it, but by stopping the leak at its source you have made a 100 per cent saving on that particular item and besides have relieved the stock handling system of recirculating that amount of stock.

Generally the white water from ground wood presses is much thinner than from thickeners. Don't mix the two, but use all of the richer water you can back in the system and send the thinner water to the Save-alls.

On the paper machines don't mix the tray water or water from the wire with that from the suction boxes. You'll find the latter only about 30 per cent as rich as the former. You can't use all of both, and the tray or wire water alone is not enough (unless you are running without trays and are using an excessive amount of shower water) so arrange to use all the richer water, make up the deficiency with suction water and send the balance of the suction water to the Save-alls.

Watch out for leaks of stock into your white water system, or for leaks of stock or rich white water into your Save-alls' supply system. For example, if you have a bad edge on the sheet set the "squirt" just far enough to trim this and give a good edge. Don't set it in to cut off an inch of the sheet to follow around beneath the couch into the white water pit. If you wash felts "on the fly" without shutting the stock off the wire, see that this thick stock is dumped back to the chest and not allowed to lie in the pit to be gradually broken up by the shower water and carried to the Save-alls. They may recover 40 to 60 per cent of it for you, but every pound that you put back into the chest means 100 per cent recovery.

A measuring system for white water losses is of the greatest value. By placing a weir in the white water sewer leaving the Save-alls a record of the flow can be obtained by the use of a liquid level recorder, and either by means of an automatic sampler or samples dipped at hourly intervals by the Save-all attendant, a cleaner or some other employe in that part of the mill, and stored in a container, a sample can be secured which will represent an average for the twenty-four hours. This sample is filtered and weighed by the laboratory and together with the volume gives a measure of the total loss for the day. Plotting this loss from day to day gives an incentive to reduce it and if leaks occur and the losses begin to mount higher an investigation can be made at once to determine the cause.

Such a measuring system gives the only means of knowing what this loss amounts to from day to day, as no dependence can be placed on the book figures showing the pounds of pulp used per ton of paper made. No one knows how much pulp is used where it is handled as soft stock. A "cord" may be a "cord," but the yield of pulp from it at different mills or in the same mill at different times, remains one of the unknown quantities of paper making, and not until all the stock used is metered can we hope to have even approximate figures.

The sewer loss figures are positive. If you are measuring all the sewers and find this loss has increased by 1 per cent, you know that it is an actual and not a fictitious loss, and search out the cause for it. Without such a measuring system many a heavy loss has been hidden by "large" cords of wood which made the book figures show a low percentage of stock used per pound of paper made.

As we said before, Save-alls are needed, but don't depend entirely upon their use.

Eliminate all unnecessary fresh water from the entire stock handling system by shutting off hose, removing unnecessary showers and using white water in place of fresh water wherever possible.

Where you are now using white water, look into the matter and see if you are using the richest supply available.

Check over your stock handling and white water systems point by point to find the leaks, and do this frequently.

Keep all unnecessary stock or rich white water out of the white water system.

When you have reduced both the volume and the fibre content of the excess white water to a minimum, then, and not until then, rely upon your Save-alls to reclaim as much more as possible, by having enough to handle the flow, run them slowly, keep them in good repair and by all means install a white water loss measuring system to give you a record of the losses from day to day.

Progress in Cost Accounting for Logging Operations*

By L. W. CAMPBELL
Laurentide Co.

THIS paper has rather a dry title. Excuse the word "dry." I realize it has no place at a Paper Convention. Possibly if I were to christen it "What do we do with the 50 cents of every dollar entering into the cost of a ton of paper?" it might seem more interesting. It's a fact that wood represents nearly half the cost of a ton of paper.

Up-to-date cost systems have been installed in our mills, the operation of which have justified one hundredfold the expense of their installation, but how much attention have we given to cost finding in the woodland end of our business?

How many of you men here today, accountants, logging operators and executives, are confident that your logging costs are as accurate as they might be, or satisfied that you are getting one hundred cents value out of every dollar you spend in the woods?

As you are either not altogether satisfied or too modest to admit it, I will try and outline briefly what accountants have been doing and what they would like to do along logging accounting lines.

In 1916, which is away back in the Dark Ages as far as paper mill accounting and cost work is concerned, certain members of the News Print Service Bureau conceived the idea of standardizing a plan for finding the cost of manufacturing newsprint.

They believed a plan of this kind was necessary for two reasons:

First, it would teach each company what its costs actually were, a thing many of us found to our sorrow we did not know during the late government investigations into the cost of manufacturing newsprint.

Second, it would allow the interchange of conversion costs between mills for the purpose of reducing those costs.

In order to accomplish this work, Mr. G. A. Ware, a chartered accountant formerly with Price, Waterhouse & Co., was engaged by the News Print Service Bureau and told to get busy. He has been busy ever since.

As a starter a series of meetings were held attended by cost men and accountants in the industry, in order to pass upon each item that would appear on our standardized cost sheets.

After these cost sheets had been completed and methods standardized for securing figures to be entered on these sheets, Mr. Ware was sent out to explain the plan to the different mills. He has succeeded in getting the system adopted by about 80 per cent of the members of the News Print Service Bureau.

This work naturally extended over two or three years and during that time meetings were held at which cost men and accountants were welcomed to put their cost problems up to the other members for advice and solution. About three years ago we had progressed far enough to enable us to begin to exchange monthly conversion costs and production statistics. This exchange was accomplished by each mill sending its figures to the News Print Service Bureau, where the details were compiled on one sheet and sent to the reporting members.

These comparative conversion costs give a mill operator a mark to shoot at. He can see just where he is higher or lower than the others.

For instance, if he notes that a certain mill shows consistently low clothing costs, he investigates and perhaps finds that they are using a certain grade of clothing or handling

*Address delivered before Woodlands Section of Canadian Pulp & Paper Association at Ritz Carlton Hotel, Montreal, Jan. 25, 1923.

the clothing in a particular way on the machines. He takes advantage of the idea and down come his costs. Many thousands of dollars have been saved in this way and we expect to save many more in the future.

During meetings held for the purpose of settling some of our mill cost problems questions often arose as to what we were doing with our woodland accounting and logging costs.

These questions were very embarrassing to most of us and in fact we had to admit that our accounting and cost work for this particular branch of the industry was in a much worse condition than our mill costs were in 1916.

Ware Prepares Book on Logging Costs

To correct this condition Mr. G. A. Ware, whom I have already mentioned, was requested to draw up and submit a uniform method of cost accounting for logging operations to a committee formed of representatives from Price Brothers & Company, Spanish River Pulp & Paper Mills, St. Maurice Paper Company, International Paper Company, Abitibi Power & Paper Company and Laurentide Company. A plan was submitted and endorsed by the committee and appeared in booklet form last June, a copy of which I have here before me. It contains sample forms and names of accounts with instructions for handling them. If its instructions are followed you will soon know more about what happens to the 50 cents in every dollar that goes into the cost of a ton of paper. If a number of us adopt the plan, it will not be long before costs will be exchanged and costs will begin to come down. Two large companies have already installed systems based on this plan, and I know that both are quite pleased with the results obtained.

I will attempt to describe briefly a few of the reports which are being compiled by the accounting department of one company, for the use of its woodlands manager and district superintendents.

First, monthly and accumulative statements of the cutting and hauling costs, showing quantities, expenditure and unit costs in detail.

Before I go any further I would like to mention the fact that we have no uniform measuring stick for determining our cutting costs.

Some companies use board feet.

This is not accurate, as the relation between board feet and the pulp content or solid content of a log varies according to its diameter.

Other companies use cord measure, but how are we going to determine the number of cords from diameters?

Who can tell us how many 7 or 8 inch logs of a given length will make a cord? This is something we ought to know if full value is to be obtained from our cost figures.

Second, statement showing list of jobbers, quantity contracted for and price. Opposite this information is shown quantity as well as the total amount of the cash advances and charges against the jobber for the period, also what these advances represent per 1,000 feet of wood produced by the jobber. A comparison of this latter with the contract rate will indicate whether the superintendent should close the jobber off, or allow him further credit for the continuance of his operations. This particular statement shows the condition of each jobber's account up to the end of any month, but if the superintendent desires, he may obtain from the District Accountant the standing of any jobber's account up to the end of the preceding day.

Third, statement showing cost per meal as served in each camp or boarding house. This expense is divided under Foodstuff, Labor and Miscellaneous and shows monthly as well as accumulative costs. The cost of feeding men is a very important factor in the cost of wood production. This year it is estimated that the cost of meals will equal an amount of 40 per cent of the direct woodlands payroll. This statement for meal costs will plainly show extravagance or inefficiency, and the cook may be educated or discharged as the superintendent sees fit. Camp cooks are often wasteful. I have often thought that a bonus system installed to keep these men on their toes would be well worth the money.

Fourth, Stable Costs: statement shows cost per horse meal in each camp under heading of Fodder, Labor and Miscellaneous. It also shows proportion of idle time which if great would indicate poor care of horses, or that the camp had more horses than required.

Fifth, Supplies: Perpetual inventory ledgers are used to record supply transactions. A statement is compiled monthly showing the total value of supplies in the districts. It shows amount of supplies purchased and transferred from one point to another. It also records the value of supplies sold to jobbers, to employees and supplies used for company operations, as well as the value and particulars of goods that have been spoiled or depreciated. Subsidiary statements which tie up with the foregoing are available which shows the value of supplies in each hangar under the following headings: Provisions—Tools & Equipment—Hardware & Miscellaneous—Table & Cooking Utensils—New & Spare Harness Parts—Clothing—Dry Goods—Medical & Toilet Articles.

Details showing quantity and value of each individual supply can be furnished the superintendent if he desires.

Many Advantages Obtained

There are many advantages to be obtained by this method of recording supplies. It reduces cost of operations by allowing the superintendent to carry the minimum quantity of supplies necessary for the carrying on of operations, thus reducing working capital and cost of insurance on goods, and loss by spoilage or depreciation. It plainly shows what articles are moving slowly in the van accounts and are therefore unpopular with the men and in many cases should not be carried in stock.

It automatically records and brings to the attention of the superintendent all depreciation and loss by spoilage. If this account is out of proportion it will indicate either inefficient store-keeping, in which case the cure is obvious, or poor storing facilities. In the case of the latter, it is up to the superintendent to decide whether to repair or rebuild.

All of these monthly statements which I have described are available for the district superintendent within two or three days after the close of each month. This result is obtained by closing our month's business on the 27th or 28th day, depending on distance of operations from the district headquarters. Copies of all figures are sent to head office from each district or division. They are all prepared in standardized form and are consolidated on a comparative statement for the use of the woodlands manager. These statements are usually completed between the eighth and the tenth day of the following month. Comparison of these figures by districts will show at once which district needs immediate attention.

You have noticed no doubt that the system has been drawn up with the object of helping the operator by giving him accurate costs and statistics while they are still hot.

Logging costs or statistics are absolutely of no value unless they are accurate, and when possible they should be completed in such a manner that they may be used for comparative purposes either internally or with other companies. For this reason it is imperative that a man skilled in accounting and costs be given full control of the cost work and also control of the necessary clerks who must handle the timekeeping and payroll and stores.

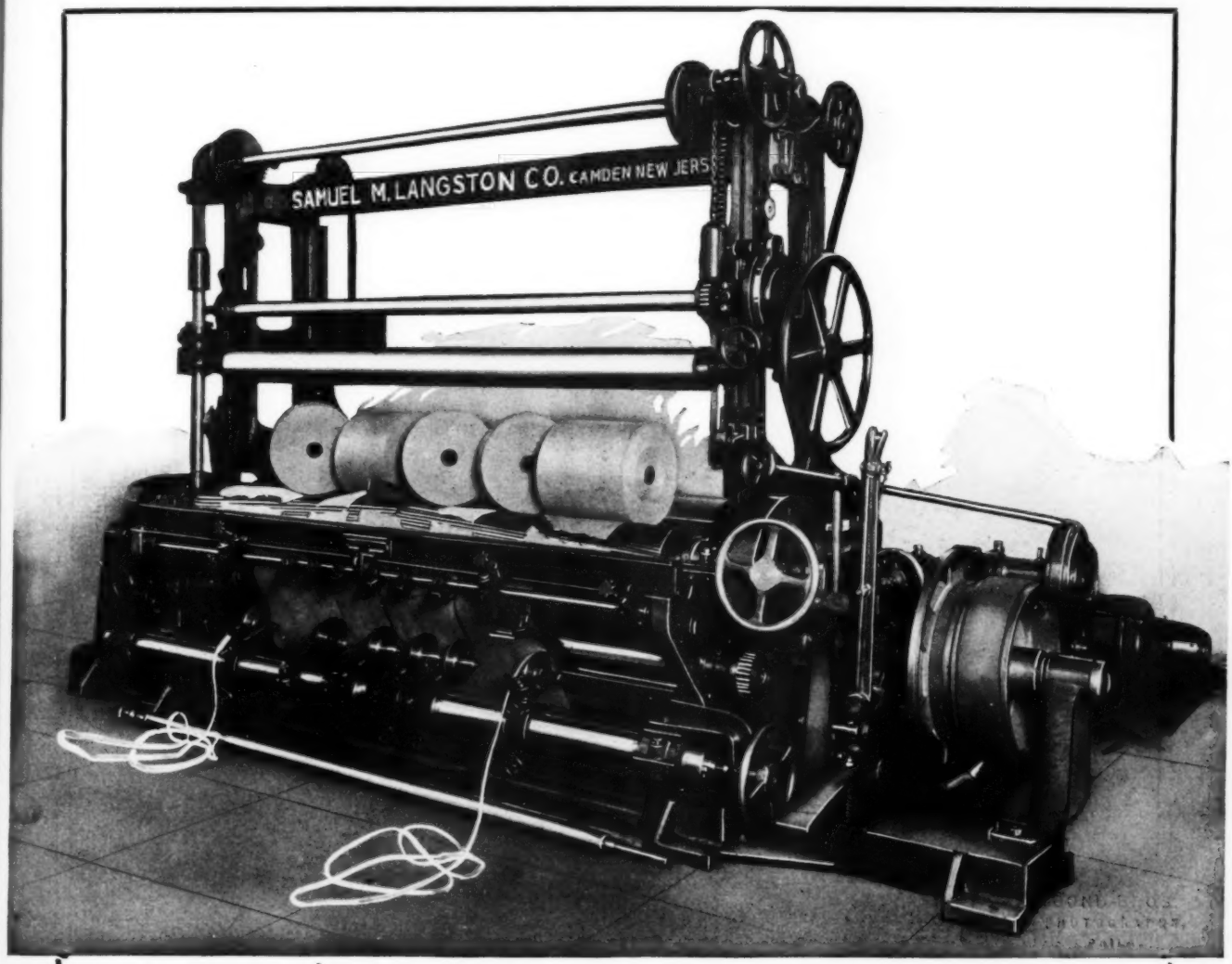
In connection with this point I will read you a part of the recommendations of the committee who endorsed Mr. Ware's system of cost accounting for logging operations:

"The successful carrying out of this proposed system is dependent largely upon the personnel of the depot and camp clerks. The committee recommends very strongly that the appointment and supervision of these men be left exclusively in the hands of the cost department. This has been tried out in practice with very satisfactory results. It is further recommended that the bureau service be made available to all members desiring assistance and advice in the proper installation of the system."

The committee was following mill organization lines in making this recommendation. The mill superintendent of to-day is too busy making paper to worry about how costs are compiled, who pays the men or looks after the supplies. Experience has taught him that accurate costs will be furnished him at the end of each month and that he can obtain on a minute's notice exact quantity and price of any supplies on hand. Why shouldn't the logging superintendent get as much benefit from the accounting department as our mill superintendent? We could save him the same amount of distasteful work and worry.

Why not go to the logging operator and say: "Let me help you cut that wood by keeping you supplied with up to the minute costs and statistics." Of course, when outsiders step up and offer free help and assistance, it often makes a man wonder when the joker will show up. Here is the only joker in this case: Accountants are in urgent need of this system in order to ascertain the true cost of wood delivered to the mill as well as to determine the proper amounts that should appear as assets and liabilities on their financial statements submitted to the management and directors.

In view of this need of the accountants and the need of the logging operators for accurate costs and statistics to enable them to cut costs, why can't we get together on this plan? According to reports, 3,750,000 cords of wood are



The Langston "BA" Winder or Rewinder

is built 62 inches to 92 inches wide. It is fitted with Koegel Cutters (ball bearing) for general work or with Langston type of driven cutters for narrow roll work. Both types are Shear Cut which means "Clean Cut"

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consumed by the requirements of the paper industry alone in the United States and Canada necessitating a yearly expenditure for logging operations of over $50,000,000.00.

Great Saving Can be Effected

Let us suppose that by the use of this plan or by any other means we can cut our costs by 2 per cent. This will result in the saving to the industry each year of $1,000,000.00. It has been said that the first million is the hardest, so there is no telling how much we may save if we go after it right.

Fifty millions per year. Do any of you know of any other industry which spends this amount or even one-tenth of it annually, without a first-class accounting and cost system?

Turn any business loose to-day, forget costs and financial statements, and how long do you think it would be before its skin would be nailed up on the barn by its competitors?

Shrewd mill management and scientific operation, as we understand them to-day, began only after proper methods had been established for obtaining costs of this or that operation in terms of cold dollars and cents.

New scientific logging methods are being advanced each year; some will suit your conditions and some may not. Without doubt you will adopt those that look good. Why not have a cost system that will tell you at the end of the season whether the change was advantageous or not?

Wood at present represents 50 per cent of the cost of a ton of paper. What part will it represent during the next ten years? Due to the increasing demand for newsprint more and more wood must be cut each year and, as men are becoming more and more unwilling to go to the bush when anything else offers, it would appear that logging costs must steadily increase.

We are face to face with this great problem of increasing costs. Let us put our house in order now and rob the blow of some of its sting by adopting methods that will allow us to watch and check carefully every dollar spent in woodland operations.

I am of the opinion that a bit of salesmanship on the part of the accountants and a little co-operation on the part of the logging operator is about all that is necessary for the to watch and check every dollar spent in woodland operations.

Gentlemen, let us tackle this work with the same perseverance and determination as that shown by the cat who climbed a fence and gazed down into a railway cutting and saw the track disappear into the mouth of a tunnel. She settled down on a post and muttered to herself: "I'll catch the mouse that dug that hole if I have to stay here for life."

A New Vapor Circulator

Since maximum production and minimum cost is desired on paper machines it is necessary to combine all of the essential fundamentals to remove the water of condensate and air from machine dryers in the most economical manner and to offer a maximum drying capacity so as to insure 100 per cent dryer temperature. This can be attained by the adoption of complete steam circulation in the paper machine dryers, insuring maximum heat transfer to the sheet of paper to be dried at the least cost per heat unit. Where water and air are present in the paper machine dryers, it is impossible to receive maximum dryer temperature compared to the steam pressure carried. Where engine exhaust is utilized in paper machine dryers for drying purposes, it is necessary to carry a very much higher back pressure on the engines than would be necessary should the air and water be entirely, constantly and economically removed. Also where the air and water are constantly removed, the sheet will be dried more evenly with less shrinkage and offer a much better finish and pop test.

Most papers should be dried gradually with the lowest temperature and pressure on the wet end which will prevent shrinkage and cockling, caused by the paper being introduced to hot dryers when in a wet state. The pressure should be gradually increased towards the dry end of the paper machine.

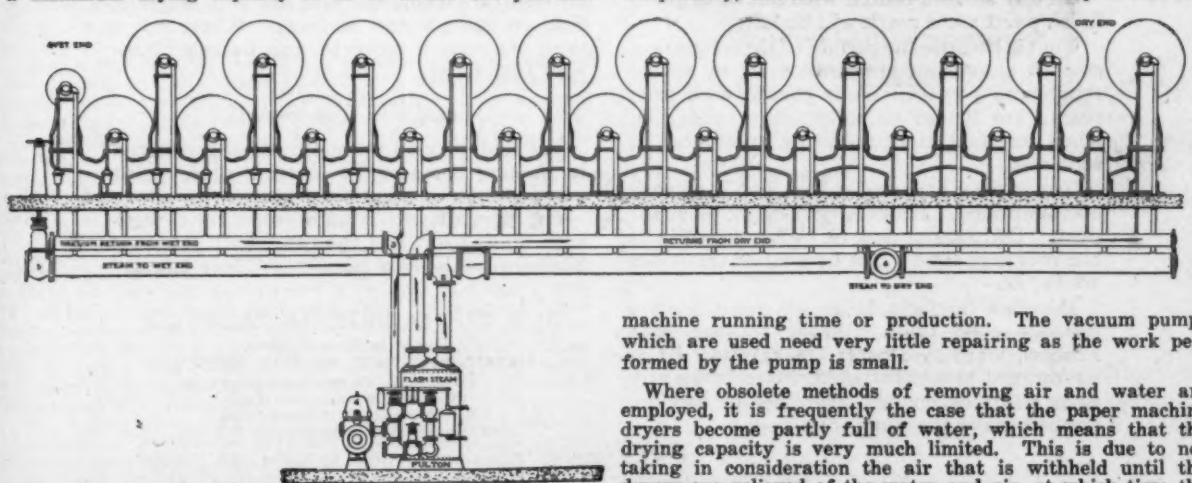
It has always been the aim and object of paper mill men to secure these results economically at a minimum cost, maintenance expense and complication. Paper mill experience indicates that it is necessary to have equipment which requires little or no attention. There has been a great deal of good equipment discarded on account of it being complicated; not only because it would not function, but because it required too much adjustment and attention incurring a great deal of useless expense.

The Fulton Vapor Circulating System, made by the Fulton Engineering Co., Middletown, Ohio, is so constructed that it can be installed under the paper machine in the basement of a mill or on the back side of the machine if there is no basement. It is not necessary to change the piping on the paper machine other than connect it to the steam supply on back side of the machine and the return line from the dryers. The installation cost is not excessive.

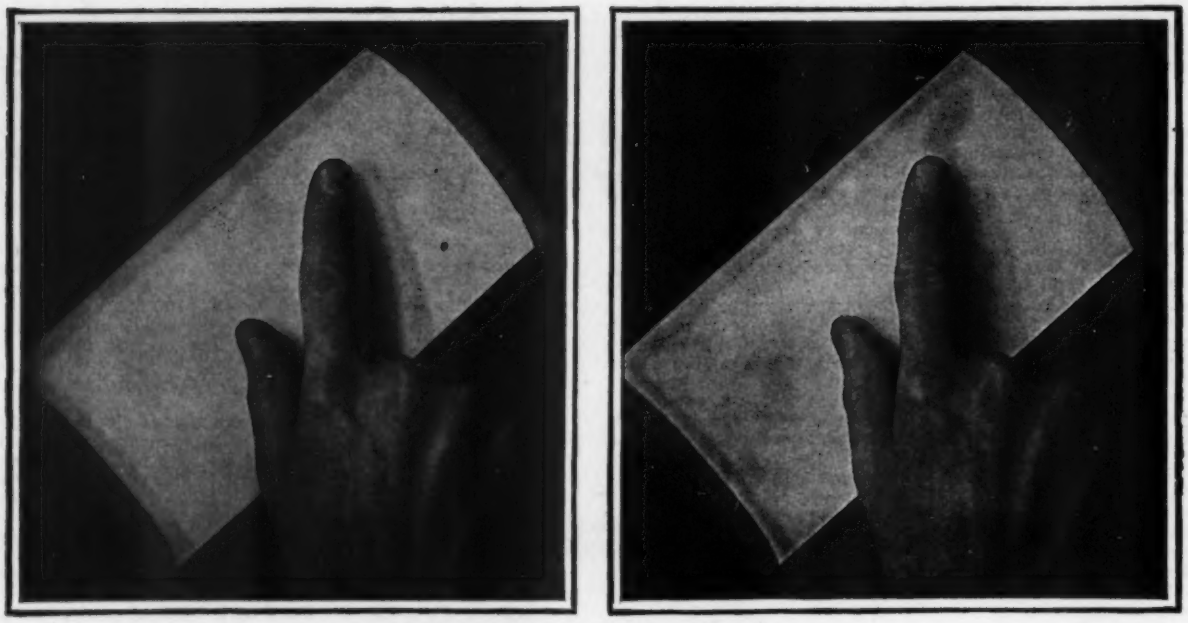
This system employs a high-class vacuum pump in connection with the method of drainage. It is possible to remove the water of condensate, from such heating equipment as there may be in the mill, at no additional cost along with the water of condensate and air from the paper machine. This eliminates the necessity of installing traps and pumps to remove water from the heating equipment and deposit the condensate in the boiler house. It insures a complete steam circulation in the steam coils. At the same time it cuts down the back pressure on the engines if exhaust steam is used. With this method there are no traps employed on the heating equipment. By returning the water of condensate from the heating coils with the Fulton method, it eliminates a great deal of otherwise necessary piping.

In some of the mills where the Fulton Method is used, it has been possible to dry paper with a partial vacuum on the machine dryers. This is brought about by rapid steam circulation and elimination of water and air constantly, which is made possible by the arrangement of piping and the installation of a vacuum pump. This is considered by many to be the most reliable and economical method of handling water and air, because the exhaust enters the paper machine to assist in drying the paper.

This new system is so designed that should the pump at some time give trouble, the water and air can be by-passed temporarily, therefore it would not be necessary to lose any machine running time or production. The vacuum pumps which are used need very little repairing as the work performed by the pump is small.



Where obsolete methods of removing air and water are employed, it is frequently the case that the paper machine dryers become partly full of water, which means that the drying capacity is very much limited. This is due to not taking in consideration the air that is withheld until the dryers are relieved of the water and air, at which time the dryers will become very hot. The ultimate results are that the pressure will vary on the paper machine a great deal and the drying will be effected according as the water collects in the dryers, the dryers will cool down until finally it will be necessary to turn on more steam pressure which will force a great deal of the water out of the dryers. The dryers will then become too hot and paper breaking will no doubt take place. This cause is very frequently responsible for loss of



TRY THIS TEST YOURSELF

Rub your finger over the smooth lustrous surface of Barreled Sunlight. It will not leave a mark. Then note the smudge your finger leaves on the porous surface of flat or egg-shell-finish paint

This simple paint test will save you trouble and expense

Try the above test on your own factory walls.

Does your finger leave a smudge, as in the panel on the right? Or is there no trace?

On any surface coated with flat or eggshell finish paint some mark will be left.

That is because the surface of these paints—smooth enough in appearance—is in reality rough and porous. Walls coated with such paints are bound to collect dust and dirt. Their original light-reflecting whiteness is soon lost.

The surface of Barreled Sunlight is smooth and unbroken. It offers no lodging place for dust. Dirt cannot sink in. Even if soiled in the course of time it can be washed clean like white tile.

Barreled Sunlight is an oil paint with a lustrous even finish. Made by the Rice Process, which we control exclusively, it is guaranteed to remain white longer than any gloss paint or enamel, domestic or foreign, applied under the same conditions.

It flows readily from the brush and may be applied also by spray as it contains no varnish.

Withstands the shock and jar of the heaviest machinery. Expands and contracts with temperature changes. Will not chip or scale. Sold in barrels and in cans. Where more than one coat is required, use Barreled Sunlight undercoat.

Send for free panels

We shall be glad to send to those interested in making the test for interior white paint two panels, as shown in the illustration above—one painted with a high-grade flat or egg-shell finish paint and the other with Barreled Sunlight. Also our booklet, "More Light."

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Factory and main offices
31 DUDLEY STREET, PROVIDENCE, R. I.
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San Francisco—38 O'Farrell Street
And 50 other distributing centers in U. S. A.

Save the surface and you save all

Barreled Sunlight

The Rice Process White

production due to the steam and temperature variation on the paper machine dryers.

With the Fulton method, the temperature and pressure will be constant so long as there is no variation in the sheet or speed of the paper machine. At the present high cost of fuel and freight rates it is essential that the back pressure on engines should be reduced to a minimum to prevent unnecessary steam consumption which will be present where excessive back pressures on engines are carried. In a great many cases the back pressure on engines can be reduced 50 to 75 per cent by eliminating the air and water constantly from the paper machine dryers, and at the same time causing engines to run at a more uniform speed, due to a reduced back pressure which in turn very frequently eliminates varying weights of paper. These are sometimes very annoying and cause loss of production.

1922 Marked by Forestry Developments

By WARREN B. BULLOCK

Secretary, National Forestry Program Committee

THE year 1922 was a great year for forestry in the United States, if not in fact, the greatest yet known by this country.

The final telling blow of the year was the message of President Harding to Congress on December 8, when he said:

"We must encourage the greatest possible co-operation between the Federal Government, the various states, and the owners of forest lands, to the end that protection from fire shall be made more effective and replanting encouraged."

With the annual meeting of the American Forestry Association in New York on January 17, and meetings of state forestry associations being held in the several states, a review of the year's achievements for forestry is not inappropriate at this time. The achievements of the year are so varied, in so many different portions of the country, that review of the year will of necessity seem disconnected and fragmentary.

Forestry sentiment is growing nationally, as evidenced by the fact that 1922 opened with the devoting of an entire week to a study of this problem by the Agricultural Committee of the House of Representatives, on the Snell bill, sponsored by the National Forestry Committee, which included the American Newspaper Publishers' Association, the American Paper and Pulp Association, the American Forestry Association, the National Lumber Manufacturers' Association, the Association of Wood Using Industries, and several more local organizations of wide influence.

The hearings by Congress on the forestry question were the most extensive ever devoted to forestry by any organization, private or public, and the facts developed will result in eventual national action for the establishment of a national forestry policy.

The Chamber of Commerce of the United States named a Forestry Committee, which traveled 10,000 miles visiting all of the country's lumber producing regions, as to the effort of the organized business interests of the country to learn the facts, upon which a future national forest policy could be predicated.

New advance steps were taken by the paper industry of the United States toward providing a future permanent supply of raw material, by the development of the national campaign for better forestry knowledge by the paper mills. The Woodlands Section of the American Paper and Pulp Association, tentatively formed in the fall of 1920 as an organization of the foresters and woods superintendents in the paper industry, became a permanent organization, and a recognized factor in the organized activities of the paper makers of the country.

The Bogalusa Paper Company, of Bogalusa, La., a subsidiary of the Great Southern Lumber Company, announced as 1922 neared its close, that it was such a believer in forestry that it had turned over to the state authorities for technical forest management, 53,000 acres, upon which timber will be grown under state law, to provide a permanent raw material supply for its paper mill. This is the biggest forestry step taken by any of the southern states' members of the American Paper and Pulp Association.

In Canada, Price Bros. & Co., a great newsprint making organization, has turned over to the absolute control of its forestry department, 900 miles of pulp wood forest. This area, north of Lake Superior, has been shown by extensive investigation, to have become more productive of a forest crop under the handling of its timber through scientific management than would have been the case under ordinary logging methods. The Spanish River Company, a Canadian property, has placed eight to ten townships, or over 300 square miles of pulpwood forest, under the control of its forestry department.

The Mead Pulp and Paper Company, of Dayton, O., con-

Paper Machinery and Equipment at Old Hickory Powder Plant Now Released for Immediate Disposal

24—Mammoth Jr. Jordan Engines. Maker Noble & Wood Co. Shell 5′ 6″ long, with 10-inch inlet and 6-inch outlet. Capacity, 30 tons per 24 hours. Will run either direction at 350-375 R. P. M. Fitted with steel bar knives, block and oak fillers.

40—Welded Steel Digesters, Maker Continental Iron Works. Capacity, 1300 cubic feet. Inside diameter, 8 feet. Length overall, 27 feet. Working pressure, 110 lbs. per square inch. Tested 165 lbs. per square inch. Each digester complete with cast iron supporting ring, cast iron false bottom, hoppers, guides, and all accessories.

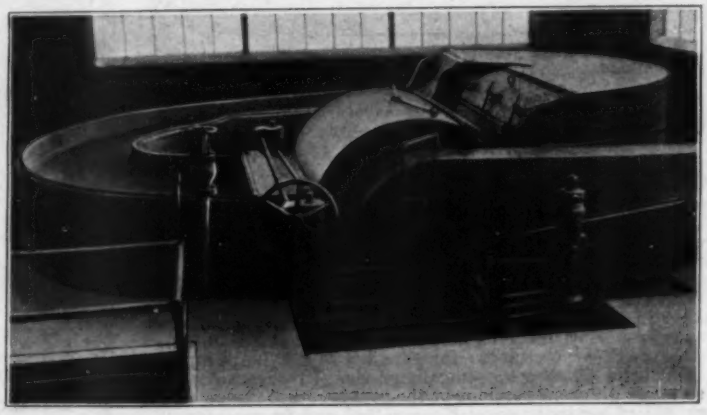
200—Wood tanks new and used.

SIZE	CAPACITY
12 ft. 6 in. x 11 ft.	15,150 gal.
12 ft. 6 in. x 18 ft.	16,680 gal.

1500—Steel Tanks—capacities, 100 to 55,000 gallons.

Let us submit complete specifications and quote prices that will save you money.

Nashville Industrial Corporation
JACKSONVILLE, TENNESSEE



Five Repeat Orders on NIAGARA Beaters in One Month

You Can Sell Beaters with Advertising But Performance Only Wins Repeat Orders

During the past month five orders for Niagara Beaters (varying in number from 1 to 4) have been received from old users of this exceptional engine. No better proof of its excellence could be given than this.

These orders come as a result of Niagara performance.

Niagara Beaters

1. Save power.
2. Save space.
3. Save time and labor.
4. Save on initial cost and installation cost.
5. Make better paper.

We have ready for you proof of the above statements. If you are interested in more efficient beater performance let us give you full particulars about the famous Niagara.

VALLEY IRON WORKS COMPANY

Plant: APPLETON, WIS.

New York Office: 350 Madison Ave.

For You

We have ready to send attractive folders and pamphlets containing information valuable to anyone using beaters. A letter will bring them to you.

trolled largely by the same interests which are back of the Spanish River Company, has conducted extensive experiments in the artificial reforestation of the Ohio Valley region with poplar and other hard woods, readily adaptable for pulp making.

The Chateaugay Pulp and Paper Company, of Chateaugay, N. Y., ordering 150,000 Norway spruce trees, gave the state of New York's conservation department the largest single order for trees for artificial reforestation placed during 1922.

There are in the paper industry eighty men whose forestry work and training is such as to entitle them to membership in the Woodlands Section of the American Paper and Pulp Association. Many more, undoubtedly, are in this work, but not organization members.

Reforestation Practiced by Many Concerns

Forest clubs have been organized in New York City and in Maine, for the getting together monthly of technical foresters, actively practicing their profession. Those in Maine are largely engaged in work for paper companies.

At least three Maine paper companies are practicing actual reforestation using chiefly spruce for pulp wood, but some pine. They are the Orono Pulp and Paper Company of Orono, Me., the Eastern Manufacturing Company of Bangor, Me., and the Pejebscot Paper Company of Brunswick, Me.

In New York three important paper companies at least are practicing technical forestry, and artificially planting cutover lands. These include the Chateaugay Pulp and Paper Company, Chateaugay, N. Y.; Finch, Pruyn & Co., Glens Falls, N. Y., and the St. Regis Pulp & Paper Co., St. Regis, N. Y. In addition, the forest lands of the Racquette Paper Co., of Potsdam, N. Y., looked ahead so many years ago that George W. Sisson, Jr., president of the company, formerly president of the American Paper and Pulp Association, sent his son to Cornell University to take a technical forestry course. This son is now head of the forestry department of the father's company.

Reforestation is most notably a development of the eastern states, where the timberland was logged off before the lake state forests were touched, and the need has consequently been felt in the eastern states much earlier than in the west.

More and more attention is being paid to forestry in the lake states. Iowa announces the planting of several small tracts the past year.

In Northern Wisconsin a technical forestry, Dr. Hugh P. Baker, executive secretary of the American Paper and Pulp Association, with two associates, one a technical forester, has in the last months of the year purchased 1,600 acres of land of which 1,100 acres will be artificially reforested, and the balance, 500 acres of land along four miles of frontage on three lakes, will be devoted to the establishment of the first forestry camp for boys in the United States. Camp Misike, as it will be known, will not be a new forest school, but a boys' private camp with a forestry training for its background. The purchase for next spring's planting of 12,000 pine and spruce trees marks the beginning of the first private reforestation to be done on an extensive scale in the middle west. Over a million trees will be planted in furtherance of this project.

The lumber industry, which has not yet felt the pressure of the depletion of the forests so seriously as has the paper industry, is, nevertheless, paying more and more attention to forestry.

Lumbermen Becoming Interested

Several regional associations of the lumber industry now have technical foresters in their executive offices. O. T. Swan, formerly of the United States Forest Service, is with the Wisconsin-Michigan Hardwood Workers, as secretary, and J. C. Nellis, also of the Federal Forest Service, has been with a lumbermen's association in North Carolina. Several other similar organizations have retained technical foresters.

The most important recent development, however, is the decision of the California redwood lumbermen to place their great western forests under forestry management, under a highly trained forester, to insure a continuous production of redwood lumber, without depletion of the forests. This development, involving as it does the national sentiment for the preservation of western tree giants, is a most significant forward step.

California pine operators have adopted a policy of handling their timberland operations in accordance with the advice of the foresters of the Federal Service, particularly in the delicate problem of brush disposal.

A development of the year was the addition of a technical forester to the staff of the American Forestry Association, to give technical assistance to the members, and others calling upon the association for advice.

The American Tree Association is a new national organi-

Impeller and wearing rings of De Laval special pulp pump

The De Laval High Efficiency Pulp Pump

HIGHLY efficient pumps for handling water containing pulp, rags and waste are now obtainable.

The open type impeller used in the De Laval pulp pump is shown in the accompanying photograph. The knife-like sides of the impeller blades running close to the side plates shear or cut stringy material.

This type of impeller gives practically no trouble from clogging under the most adverse conditions, and when handling materials that quickly clog closed impeller pumps.

The side plates, which surround the eye of the impeller, are removable parts, held in recesses in the pump casing and impeller. Like the impeller they are made of bronze.

The pump shaft is protected from strings, rags, etc., wrapping around it by stationary sleeves. It is also encased in bronze sleeves which extend from the impeller out through the packing glands, preventing wear by the latter upon the shaft itself.

The De Laval pulp pump runs at speeds which permit direct connection to standard speed motors and turbines. A recent test on an 8 in. pump driven by synchronous motor showed an efficiency from wire to water of 64%, and a 10 in. pump an efficiency of 66%.

The De Laval pulp pump, like all other De Laval centrifugal pumps, is built on the split casing principle, being divided horizontally in the plane of the center line of the shaft. All internal parts are at once accessible upon lifting the casing cover, and can be removed after loosening the bearing caps. The suction and discharge connections are in the lower part of the casing and need not be disturbed.

All parts of De Laval apparatus are made to limit gages on an interchangeable basis, and replacements can be inserted by men of ordinary intelligence, using parts ordered from the factory by means of the identification symbols which will be found stamped upon each part. Special metals are used where required to withstand corrosion.

For handling water required in paper mill applications, such as circulating pumps, service pumps, boiler feed, fire pumps, etc., etc., De Laval centrifugal pumps are superior to all others.

Ask for Catalog C 82

DE LAVAL
STEAM TURBINE COMPANY
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Another Satisfied User of Harland "Interlock" Sectional Electric Drive

WRITES TO THE PRESS

. . . the drives for the two machines being identical in all respects. These drives are of the well-known interlock type as made by the Harland Engineering Co., Ltd., and are the first to be installed in this country for driving fast running machines. The many advantages which are claimed for this type of drive have been fully borne out in practice in this installation.

(The Paper Maker, London January, 1923)

Why not let us put you in the position to say the same. You will if you install "Interlock" Drive on your machines—be they high speed, wide or variable speed. For either newsprint, book or bond, kraft or tissue papers.

The Harland Engineering Company of Canada

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MONTREAL

Representative for Central and Western U. S. A.

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CHICAGO

zation, with a somewhat broader scope, though with generally similar ideals, which will take over by agreement with the American Forestry Association the public educational work formerly done by the latter organization.

Many of the important developments of the year have undoubtedly been omitted in this review, but the achievements recorded will amply justify the belief that 1922 set a new record of forestry accomplishments.

The year just closing was marked by extensive forestry legislation in many of the states, particularly steps toward lifting the tax burden on growing trees which now discourage many who would otherwise develop cutover lands. The year to come is full of promise for definite legislation both in states severally and in Congress to establish a national forestry policy co-ordinating the work of the nation, the states, and private timberland owners.

Kalamazoo Valley

Kalamazoo, Feb. 1, 1923.

A. L. Pratt Withdraws as Head of Allied

Alex G. Gilman was elected president of the Allied Paper Mills, at the annual meeting of the concern held January 25th He succeeds Arthur L. Pratt, for the past twenty-two years head of the King Paper Company and the Allied Paper Mills.

Mr. Pratt retires from active duties at his own request, being in poor health. He plans to take an extended western trip and will spend several months on the open ranges of Montana. As recognition of past services, Mr. Pratt was retained as chairman of the board of directors and will preside at the meetings of that body when in Kalamazoo.

Mr. Gilman has resided in Kalamazoo for 17 years. He got his first paper mill experience in the East and then moved to Ypsilanti, where he was employed by the Peninsular Paper Company. When George Comfort was elected president of the Monarch Paper Company, Mr. Gilman came to Kalamazoo as stenographer and bookkeeper. Very shortly after that he was advanced to the position of secretary and remained with the Monarch until that concern was merged into the Allied Paper Mills, when he was elevated to the post of the first vice president.

Other officers elected for the ensuing year are: First vice president, George H. Gerphide; second vice president, John A. Pyl; secretary, George S. Davis; treasurer, S. B. Monroe.

The board of directors includes: Alex G. Gilman, A. B. Connable, C. A. Dewing, George Hanselman, A. D. Kettle, A. L. Pratt, George S. Davis, W. E. Kidder, S. B. Monroe, John A. Pyl, Charles A. Peck, E. S. Rankin, G. W. Ritchie, H. L. Vanderhorst, George H. Gerphide, Kalamazoo; E. G. Read, Richland; J. W. Thompson, E. J. Dayton, Detroit; G. E. Bardeen, Mrs. Florence G. Bardeen, Otsego; George D. Cobb, Schoolcraft.

In his annual report to the stockholders and directors, President Gilman outlined the betterments that have been made during the initial year of the Allied Paper Mills' existence. He also named various improvements that are recommended for the immediate future.

The retirement of Mr. Pratt as head of one of the five largest paper concerns in the Kalamazoo Valley district is an interesting event in local annals. He was one of the prime movers in the organization of the King Paper Company, when it was formed back in 1901 with a capital of $150,000 and erected a one-machine mill. That concern's capitalization was later increased to $2,000,000 and when it became a division of the Allied Paper Mills, the plant now has four machines and a complete coating mill.

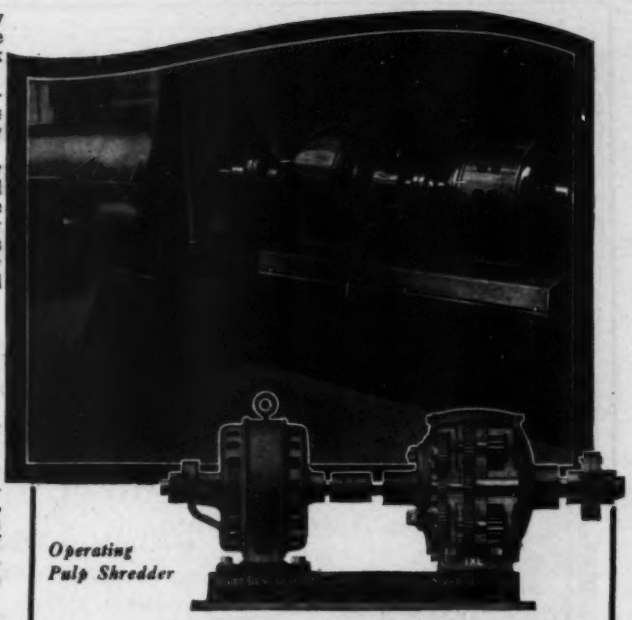
A few years ago he erected just south of the city of Kalamazoo, a delightful suburban home, one of the finest estates in this section of Michigan. It has been reported this place is now on the market, in fact it has been quite widely advertised as being for sale. In addition to a palatial residence, it boasts spacious grounds, comfortable quarters for servants, a lodge house and its own hydraulic electric power plant. This establishment represents an outlay of over $250,000.

Officers of Two Companies Re-elected

Routine business only developed at the annual stockholders' meeting of the Lee Paper Company, Vicksburg, Michigan, and the Michigan Paper Company, Plainwell. Reports showed that both companies enjoyed a good business during 1922, while the outlook for the coming twelve months is bright.

Officers and directors of the two companies were re-elected as follows:

Michigan Paper Company: President, K. D. Wagner; vice president, E. A. Stowe; general manager, secretary and treasurer, G. W. Gilkey; superintendent. William Thomas; sales manager, T. D. Earl; directors, J. D. Wagner, G. W. Gilkey, William Thomas, H. J. Mesick, Plainwell; H. C. Jackson,



Operating Pulp Shredder

How do YOU determine the best type of transmission for reducing the speed of electric motors operating conveyors, beaters, pulp shredders, etc?

IS YOUR INSTALLATION SPACE LIMITED? **Foote Speed Reducers** are compact. They can be furnished to drive at either end or at top or bottom. They are set close to the motor.

WILL YOUR MEANS OF TRANSMISSION BE SUBJECTED TO DIRT, DUST OR GRIT? Dirt, dust and grit quickly wear out open gears, ropes, chains and belts. All working parts in **Foote Speed Reducers** are enclosed and protected. Their life is long.

ARE YOUR MEN ENDANGERED WORKING NEAR YOUR DRIVES? **Foote Speed Reducers** are fool proof. Workers cannot get their fingers or clothes into moving parts. **Foote Speed Reducers** provide positive safety. They also eliminate fire and explosion hazard.

DO YOU NEED ALL POSSIBLE POWER FROM YOUR MOTORS? **Foote Speed Reducers** are entirely enclosed and all gears run in a bath of oil. End and side thrusts are eliminated and scientific engineering insures the deliver of maximum power.

DO YOU REQUIRE A BIG REDUCTION? **Foote Speed Reducers** are made for motors of any horse power in ratios from 5 to 1 up to 500 to 1.

ARE YOU IN DOUBT AS TO THE PROPER DRIVE TO INSTALL? Our Engineering Department will assist you in solving your speed reduction problems—no obligation to you.

CONSULT FOOTE ENGINEERS

Let us tell you about some of the many different applications for Foote Speed Reducers. Our Engineering Department is at your service without obligation. WRITE US TODAY.

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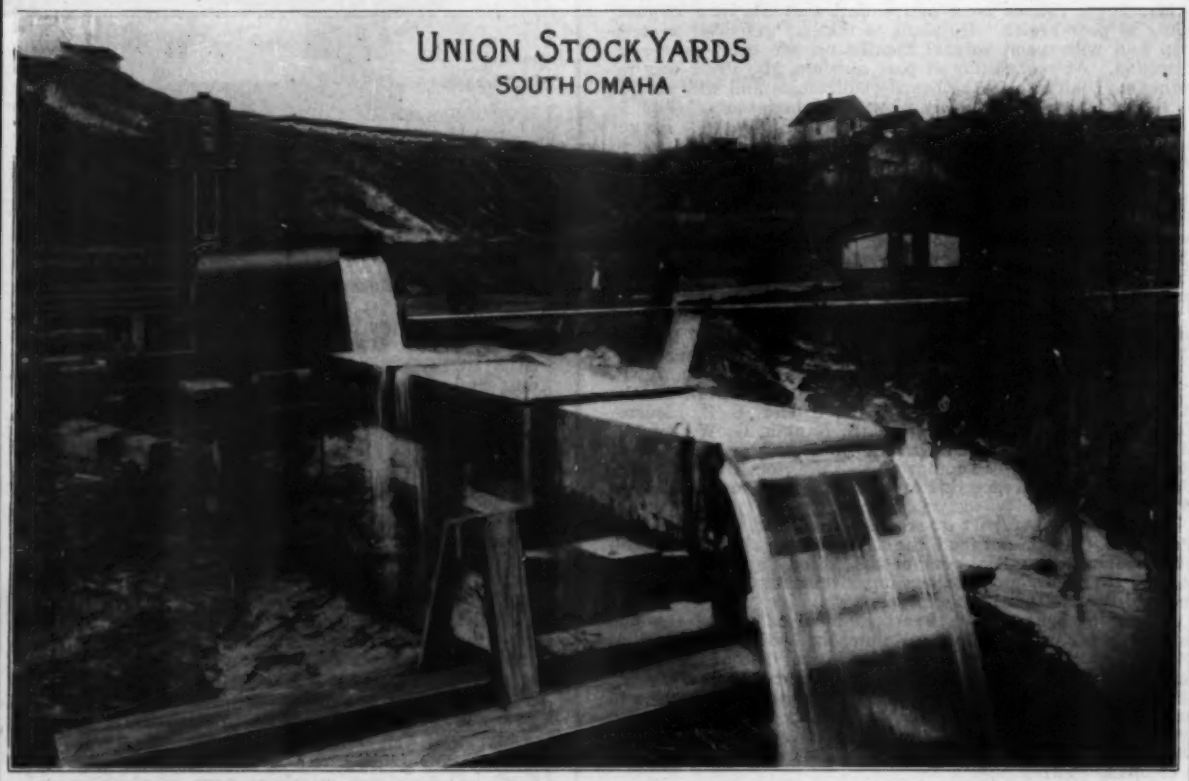
You will never be short of water at Your Paper Mill if you install Gregg Propeller Pumps in your tubular wells. You do not need more wells. You need Gregg propeller pumps to develop your present wells to their full capacity and give you greater pumping economy.



Testing Ten Inch Tubular Well for Union Stock Yards Company. One million Gallons of Water per day pumped from this well during a Twenty-four Hour Test. Fourteen Gregg Propeller Pumps have been installed in this plant.

We have our deep well pumps in successful operation at the Kalamazoo Vegetable Parchment Co., the Bryant Paper Co. and the Allied Paper Mills, Kalamazoo, the Alton Box Board & Paper Co., Alton, Ill., and many other prominent plants. If you are short of water at your plant we are prepared to help you out. Send us your well data, we will do the rest.

GREGG PUMP COMPANY

1417-1425 Fulford Avenue Kalamazoo, Michigan

Kalamazoo; B. D. Keppel, J. Pelgrim, Holland; E. A. Stowe, George M. Ames, Grand Rapids.

Lee Paper Company: President, Fred E. Lee; vice president, G. E. Bardeen; secretary-treasurer, Norman E. Bardeen; directors, Fred E. Lee, A. B. Gardner, John A. Howard, Dowagiac; Dr. H. C. McKain, Vicksburg; Sam Folz, Norman Bardeen, Kalamazoo; G. E. Bardeen, Otsego; George D. Cobb, Schoolcraft.

Interesting Meeting Held in Kazoo

The Michigan Division of the American Pulp and Paper Mill Superintendents Association held its regular monthly meeting at the Park-American Hotel, Kalamazoo, January 18. This meeting was typical of the splendid educational affairs that have made the Michigan division of superintendents one of the strongest local organizations in the industry.

Tables were set for thirty, but upon gathering in the dining room it was discovered that this was not enough, being close to forty attending the meeting.

After the supper, Mr. Rove of the Nordberg Manufacturing Company, gave a very interesting and instructive illustrated talk on the uniflow engine and its relation to the paper mill. By no means the least important part of Mr. Rove's talk was the discussion which followed the talk proper. In this discussion questions were asked which pertained to specific cases in the minds of the attending superintendents. The thorough way in which these questions were answered by the speaker made this part of the meeting of immense practical value to all present.

Questions which had been asked but not satisfactorily answered at the previous meeting were then answered by letters received by the secretary in response to his inquiries regarding these various subjects. The secretary also read an invitation from Claud E. Nicely inviting the superintendents of Michigan to hold their March meeting in South Bend at the LaSalle Hotel. This invitation was unanimously accepted, and, may we say, with just the suggestion of smacking lips.

Near the close of the meeting a plan was proposed which promises to develop into something of importance. This plan will be discussed at length as soon as something definite has been attained.

Those attending the meeting were as follows: M. M. Brisbois, Southerland Paper Co.; C. E. Maeser, Green Bay Wire Works; A. MacPhillips, Doud Knife Works; B. Benson, Williams Gray Co.; C. E. Nicely, LaSalle Paper Co.; C. W. Ulrich, Wolverine Paper Co.; Frank Jessup, Allied Paper Mills; Albert Lendner, Allied Paper Mills; Verne Lood; John Ryan, Kalbfleish Corporation; C. L. Harter, Rex Paper Co.; Alfred Bryant, Bryant Paper Co.; L. W. Simpson, Allied Paper Mills; E. H. Gilman, Bryant Paper Co.; Geo. McGuire, Bryant Paper Co.; E. E. Keyes, Kalamazoo Vegetable Parchment Co.; F. W. Johnson, Allied Paper Mills; R. E. Bevis, Kalamazoo Vegetable Parchment Co.; Ed. T. A. Coughlin, Allied Paper Mills; C. G. McClellan, Kalamazoo Vegetable Parchment Co.; Frank Libby, Kalamazoo Vegetable Parchment Co.; Fred Schied, Watervliet Paper Co.; M. Redmond, Kalamazoo Paper Co.; Walter S. Gregg, Gregg Pump Co.; Oliver Buswell, The Paper Industry; E. C. Rutz, Bryant Paper Co.; C. J. C. Lamberten; Geo. H. Wallace; A. G. Wightman, Hawthorn Paper Co.; C. O. Thorne, Watervliet Paper Co.; Martin Mulder, Allied Paper Mills; Geo. H. Pountain, Allied Paper Mills; O. W. Beyer, Kalamazoo Vegetable Parchment Co.; I. J. Eash, Hawthorn Paper Co.; J. Kuss, Allied Paper Mills.

Committee to Look After Eddy Stock

Apportionment of the stock of the Eddy Paper Corporation of Illinois to the holders of the common and preferred stock of the Eddy Paper Company of Michigan is to be worked out by a committee which will be empowered to report at a stockholders' meeting to be called at some future date, was the main accomplishment of the stockholders' meeting of the Michigan corporation January 11th in Three Rivers, Michigan, according to the information furnished by Charles A. Blaney, president of the Eddy Paper Company.

The committee, which is said to be representative of the holders of both classes of securities in the Michigan company consists of Thomas W. Cavanaugh, Paw Paw, Michigan; Harry C. Howard, Kalamazoo, Michigan; Joseph W. O'Brien, Grand Haven, Michigan; Howard Lindsey, Three Rivers, Michigan, and Howard H. Buckhout, Kalamazoo, Michigan.

According to the provisions of the purchase of the assets of the Michigan corporation, the Eddy Paper Corporation of Illinois, assumed all indebtedness of the Michigan company and in addition agreed to exchange 31,250 no par value

Standardized Rosin for Sizing

Discriminating paper manufacturers recognize the advantages of using a rosin which meets rigid specifications without variation. Hercules Wood Rosin has these advantages. It is produced by a process which allows accurate chemical control at every step. It is absolutely free from dirt. Each successive shipment is of the same quality.

Those manufacturers who have co-operated with our technical staff to adapt Hercules Wood Rosin to their needs are profiting by their foresight. Our service men may be able to help you by demonstrating that, except for very light colored paper. Hercules Wood Rosin is superior to gum rosin. We would be glad to give you further information.

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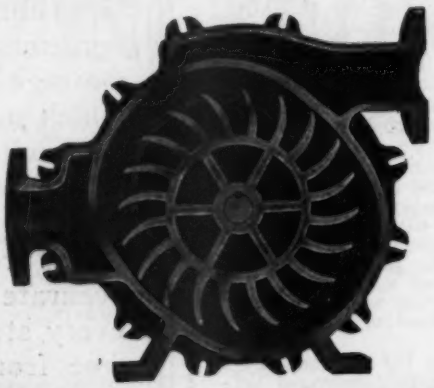
HERCULES
Naval Stores
Produced Under Chemical Control

THE HYTOR VACUUM PUMP FOR FLAT BOX SERVICE

Vacuum Produced Absolutely Without Pulsation

No Vibration

Saves Wires



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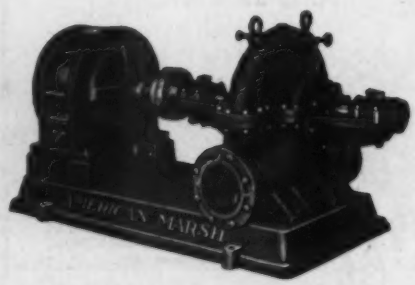
American-Marsh Paper Mill Pumps

Centrifugal and Direct Acting



ESPECIALLY adapted for paper mill service where absolute reliability and high efficiency are required. There is an American-Marsh pump for every paper mill requirement, from draining the rolls on the dryers to handling heavy paper pulp stock.

Because of the fact that the factory is located in the heart of the largest paper mill district in the world, we have always made a specialty of paper mill pumps and our designs are the result of careful first hand study of the actual requirements.

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Centrifugal Pumps
Stock Pumps
Deep Well Engines
Jet Condensers
Air Compressors
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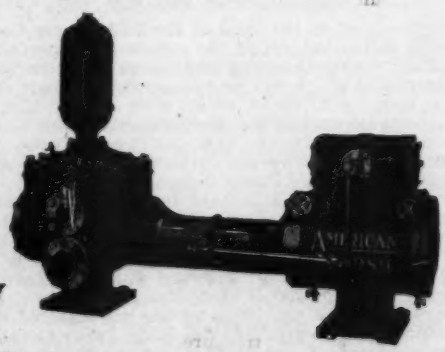
Power Pumps



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Battle Creek, Michigan

shares in the new company for 700,000 shares of common and 175,000 shares of preferred in the old company.

While it is generally admitted in financial circles that the deal consummated was the only move possible whereby debts could be met and the stockholders receive anything, there has been much lively discussion regarding the relative rights of the common and preferred stockholders. One element has advanced the opinion that common and preferred should share and share alike. In that case one share of stock in the Illinois corporation would be given in exchange for 28 shares of the old company.

Another element, largely representative of those buyers who invested during the intensive sales campaign of the seven per cent preferred stock declare openly that they have priority rights as to assets.

Safety Record Made at Kalamazoo Mill

A safety contest has been going on among the mills of the Kalamazoo Paper Company. Having but one accident in a year's time, sufficient to cause loss of time to the victim, has resulted in mill No. 2 of this company receiving the safety contest banner. The presentation was made by President F. M. Hodge at a mid-winter social gathering of the company.

The safety contest banner is a feature developed by John Bungers, W. A. Nichols, Leonard Allen, J. C. Estes, and the Misses Gertrude Hacking and Gertrude Vroegindewey. The banner is a silk American flag, bearing the words, "Safety Honors" beneath, with the name of the company above. It is framed.

Mill No. 5 was second in safety honors, having had only two lost time accidents in the past year. Provisions of this competition call for a return of the flag to the committee every three months, when it will in turn be given again to the mill or division having the best record.

At a recent annual meeting of the Kalamazoo Paper Company all the officers and directors were re-elected for another year.

The directors re-named are: F. M. Hodge, A. E. Curtenius, E. C. Parsons, Woodbury Ransom, C. S. Campbell, A. B. Connable, D. R. Curtenius, C. H. Kleinstuck, W. S. Dewing, all of Kalamazoo, Michigan, and D. F. Altland, of Detroit.

The officers held over for the ensuing year are: President, F. M. Hodge; vice president, D. F. Altland; secretary-treasurer, A. E. Curtenius.

Rex Personnel Changes

Merrill B. King was re-elected president and general manager of the Rex Paper Company, Kalamazoo, at the annual meeting of the stockholders held January 16th in the offices of the company. Clarence A. Bradford, vice-president and general sales manager was also re-elected.

Three new members were named on the board of directors of the company replacing William M. Loveland, A. L. Aldrich, and E. H. Hacking, former secretary-treasurer. The new members elected are: Mrs. John F. King, Harry C. Bradford and E. V. McCulver, all of Kalamazoo.

Two changes were also voted in the official personnel of the company by the election of Harry C. Bradford, formerly of the Allied and Lee paper companies, as secretary, and R. F. McCulver as treasurer.

The board of directors for 1923 now consists of M. B. King, Clarence Bradford, W. G. Erwin, Columbus, Ind., re-elected; Harry H. Cramer, Minneapolis, re-elected; Mrs. John F. King, Harry C. Bradford and R. V. McCulver.

Officials announced that the Rex Paper Company enjoyed a very satisfactory business during the year of 1922, the plant running full time day and night throughout the entire year in spite of the railroad and coal difficulties, and the unsteadiness of the raw material market. The outlook for 1923 is considerably brighter and the company is looking forward to an even better year than that which has passed.

MacSimBar Company Report Good Business

An excellent run of business for 1922 was reported at the annual meeting of the MacSimBar Paper Company held January 23rd at the company's office in Otsego. The outlook for 1923 is also favorable.

During the past twelve months this concern has completed its new power plant, which is now in use, guaranteeing adequate power to turn the wheels of the big mill at a capacity production.

All officers and directors were re-elected as follows: President, Charles E. Nelson; vice president, S. W. Simpson; secretary, S. B. Monroe; treasurer, George E. Bardeen; directors, George D. Cobb; S. W. Simpson, W. D. Kidder, S. B. Monroe, S. G. Earl, Kalamazoo; E. W. Stone, Allegan, J. V. Thompson,

THE "UNIVERSAL GIANT" CAST IRON DROP HANGER

"UNIVERSAL GIANT" CAST Iron Hangers are non-flexible and hold the shaft in position without bending or working apart.

BALL and SOCKET ADJUSTMENT reduces friction and insures perfect alignment of shafting.

RING OILING BEARINGS provide positive automatic lubrication.

T. B. WOOD'S SONS CO.
CHAMBERSBURG, PA.

POWER TRANSMITTING MACHINERY

Progress and Papermaking

No. 6

Messages Across Time and Space

The savage who beats a war drum sends a message across space. The cave man who painted his wall has sent us a message across time. But it requires paper and printing to send **many** messages across both **space** and **time.**

Pick up a book and read a play of Shakespeare's. You have discounted three centuries of time and three thousand miles of space. And a million other men can do the same thing at the same moment. Paper made this possible.

The last check you cashed was part of an intricate system of conducting business every step of which was facilitated by the use of paper.

The inscription on the new Post Office Building in Washington applies with singular aptitude to paper:

"Carrier of news and knowledge,
Instrument of trade and industry,
Promoter of mutual acquaintance,
Of peace and good will among men and nations.
Messenger of sympathy and love,
Servant of parted friends,
Consoler of the lonely,
Bond of the scattered family,
Enlarger of the common life."

HAMMERMILL PAPER CO., *Erie, Pa.*

NEW YORK OFFICE: 291 BROADWAY

Detroit; F. C. Hall, Grand Rapids; J. A. Vanderveen, Holland; C. E. Nelson, G. E. Bardeen, Otsego.

K. V. P. Authorizes Bond Issue

A bond issue of $3,000,000 to be sold when needed, was authorized by the stockholders of the Kalamazoo Vegetable Parchment Company, when the company held its annual meeting last month in its own Community house.

Reports for the past year showed that business has been generally satisfactory, while good progress is being made on the concern's vast building and expansion program.

The following board of directors was re-elected for the ensuing year: Jacob Kindleberger, W. J. Lawrence, C. S. Campbell, A. B. Connable, W. M. Loveland, Austin B. Read, Charles A. Peck, C. H. Stearns, William O. Jones.

The officers are: President, Jacob Kindleberger; first vice president, Frank Mosteller; second vice president, James Greenlee, Chicago; secretary, S. Ward Kennedy; treasurer, C. S. Campbell.

Cooper to Kalamazoo Stationery

Bert H. Cooper, for several years assistant purchasing agent at the Kalamazoo Paper Company where he worked directly under the supervision of A. E. Curtenius, secretary-treasurer of the company, has severed his connection with that concern and is now with the Kalamazoo Stationery Company.

The acquisition by the Kalamazoo Stationery Company of the E-Z Opener Bag Mill at Taylorville, Illinois, gives Mr. Cooper opportunity to fill a responsible position with his new connections. He will be located in the Kalamazoo office. K. R. Cobine, vice president, having been transferred to the Taylorville division.

The annual meeting of the Western Board and Paper Company resulted in the re-election of the following officers and directors: President, A. E. Curtenius; vice president, W. H. Scott; treasurer, Michael Redmond; secretary and general manager, Winship A. Hodge; directors, A. E. Curtenius, F. M. Hodge, W. H. Scott, Michael Redmond, Charles G. Bard. During the past year the company has enjoyed a uniformly excellent business, when the widespread depression in the board mills activities is taken into consideration. W. A. Hodge, general manager, in his report showed the property is in excellent condition, about $45,000 having been expended during 1922 in betterments.

The Kalamazoo Sheet Metal Manufacturing Company has just completed extensive improvements at the King division of the Allied Paper Mills. This is an installation in the machine room designed to take care of condensation of steam above the machines, and prevent serious damage to the roof. By means of fans and heater coils, air at a temperature of 90 to 95 degrees is diffused throughout the regions just under the roof, thus eliminating steam condensation and consequent dampness and rotting.

Mill No. 1, of the Bardeen Paper Company located at Otsego, Michigan, was badly damaged by fire on the morning of January 19th. Fire broke out in a coal elevator of the mill doing several thousands of dollars' damage before it could be checked. The fire, which lasted about an hour, did not do so much severe damage, but water destroyed a large quantity of the paper stock and sulphite on hand. Officials of the mill believe that the fire was caused by friction in the elevator shaft.

The new paper sales warehouse now being erected for the Bermingham & Prosser Company at Kalamazoo is about 95 per cent completed and when finished will represent one of the finest buildings of its kind in the West.

The Watervliet Paper Company, located at Watervliet, Michigan closed down several of its mills the other day for the installation of new rotary screens. The mills were down about a week.

The Cellulose Division of the American Chemical Society has recently been authorized as a permanent division of the Society and wishes to enroll as members in the division all those who are interested in cellulose chemistry either from a scientific or practical standpoint. All members of the American Chemical Society wishing to become members of this division are requested to send their names and business connection together with one dollar ($1.00) for dues to the Secretary, L. F. Hawley, Forest Products Laboratory, Madison, Wisconsin.

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presents a perfect wrapping paper, weight and strength for each wrapping purpose. Made in all weights from 15 pounds to 100 pounds basis. The one complete, standardized and economical line of wrapping paper sold.

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"The Wrapper that Delivers the Goods"

Rigid Economy in Material Handling accomplished with

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Locomotive Cranes and Buckets

Rapid in operation Low maintenance cost

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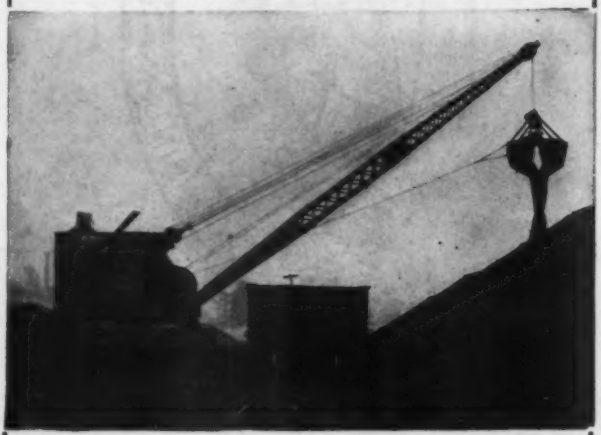

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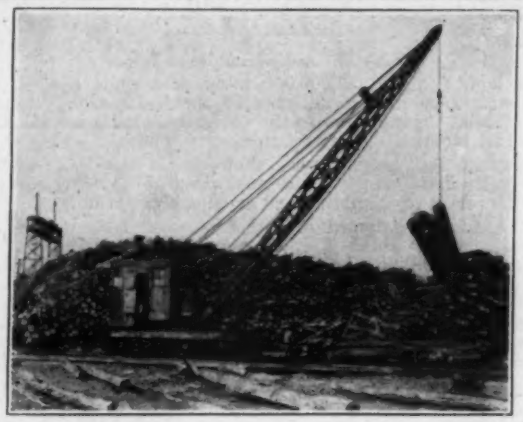


Reduce Material Handling Costs

When the cost of common labor began to rise the American Splint Corporation decided to install a Type E "Industrial" Crane to handle and pile logs into tiers 45 feet high. Three men and the Crane now do this work which formerly required twelve.

Daily cost is $19.17 with the Crane, against $75.60 for the twelve men, under low wages. The saving is $56.43 a day, or $16,629.00 for 300 working days.

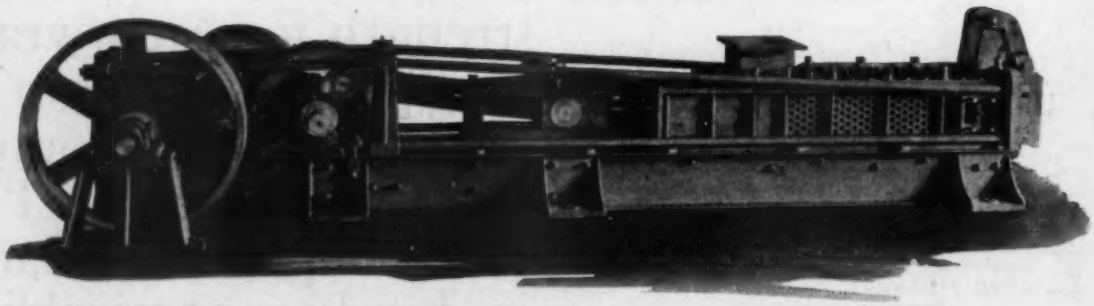
"This convincing proof of the savings made prompted us to order a second, or duplicate Crane, which we found as convenient and economical as the first," says Paul N. Hayes, Vice-President and General Manager of the American Splint Corporation.

A look into your own methods would perhaps reveal conditions which an "Industrial" could remedy in the same way.

Write for our illustrated catalogue No. P-189

INDUSTRIAL WORKS, Bay City, Mich.

THE GIANT NEKOOSA BARK PRESS



This machine, driven by a 25 H. P. motor, presses wet spruce bark 52% bone dry, and wet hemlock bark 49% bone dry. This refuse is thereby turned into a good, usable fuel.

Nekoosa Motor & Machine Co.

Paper Mill Machinery, Iron, Brass and Sulphite Bronze Castings

NEKOOSA, WISCONSIN

New England

Boston, February 1, 1923.

New England Salesmen Meet

The New England Group of the Salesmen's Association of the Paper Industry held its annual Mid-Winter Meeting at the Colony Club, Springfield, Mass., on Friday evening, January 5, 1923.

About 60 members and guests participated in the dinner, and among those present were:

Immediately after the dinner, which was enlivened by several "peppy" songs, the toastmaster, Mr. Fred W. Main of the Worthy Paper Co., introduced the first speaker of the evening, Rev. John M. McGann, of Springfield, who spoke in a very interesting and humorous way of his early business experiences.

Mr. Walter J. Raybold, president of the B. D. Rising Paper Company of Housatonic, one of the principal speakers, spoke then on the "Relation of Salesmen to Industry." Mr. Raybold referred to the evolution of today's salesman. He divided that process, which took place during the past twenty-five years, into three periods; viz:

1. The Trunk and Bag Period.
2. The Brief Case and Leather Wallet Period.
3. The Standard Prices and Advertising Period.

Must Sell an Idea

The salesman, Mr. Raybold continued, has developed in that period from a mere order-taker, who sold any quantity of paper to any person at the best price he could obtain, into the highest type of business pioneer. His mission is to sell a certain idea and service. He represents the connecting link between the manufacturers and their customers. The speaker, furthermore, dwelt on the question of standardization and pointed out that dealers are becoming more and more interested in the "Mill Brand" idea, and that "Private Brand" will disappear to a very great extent. To sell the Mill Brand idea, backed by the manufacturer's reputation, is an important part of the salesman's mission.

Dr. Hugh Baker, secretary and treasurer of the American Pulp and Paper Association, the next speaker, pointed out the importance of export and called the manufacturers' attention to the great possibilities the export field offers. He then read a very instructive paper on his recent trip throughout the Scandinavian countries, Germany and Austria. He treated especially the paper and pulp industry of Sweden, Norway and Finland, and described the reforestation of woodlands in the former country, methods of conveying pulpwood to the mills, preparing of wood and the various phases of the manufacture of pulp. The speaker put great emphasis on the highly efficient methods used in the elimination of waste in those countries. Elimination of waste is treated in a thorough and methodical way in the Scandinavian countries, and wonderful results have been achieved along these lines. Concluding his speech, Mr. Baker mentioned that among the Scandinavian manufacturers prevails the tendency to ship, in the future, paper to the United States rather than the pulp.

Other speakers of the evening included Messrs. Sidney L. Willson, vice-president and general manager of the American Writing Paper Co.; Clifton A. Crocker, president of the Chemical Paper Manufacturing Co., and Crocker-McElwain Co., of Holyoke; George Galliver, president of the American Writing Paper Co.; J. L. Fearing of the International Paper Co., and vice-president of the Chicago section of the Salesmen's Association; J. Donald McLaurin of New York, and H. H. Reynolds of the B. D. Rising Paper Co., president of the Salesmen's Association of the Paper Industry.

The speakers emphasized the importance of the salesmen in the industry. They are the men who represent the organization to the customer and outsider, and upon whose skill and enthusiasm depend to a very large degree the prosperity, reputation and volume of business of their respective houses.

At the close of the meeting, Mr. H. H. Reynolds spoke a few words in behalf of the association, pointing to the many benefits a salesman may derive from being a member. He referred to the good fellowship created through the association and its rallies, which have done very much toward the dispersion of animosity between "competitors," and which have created a new spirit of co-operation and good understanding, such as was entirely unknown in the past.

In closing the meeting, it was decided that the local section shall hold meetings more frequently, and secure as speakers experts in the manufacture and sale of paper.

The paper board mill which James E. Smith of Baltimore bought in Norwich, Conn., last month has been incorprated with $1,500,000 capital. One machine is now operating mak-

Announcing

The Conveyor Division of The Brown Hoisting Machinery Company. This department is now manufacturing a complete line of Belt Conveyors, Chain Conveyors, Coal Crushers, Screens, etc.

The same fine quality that is found in all material handling machinery bearing the Brownhoist mark is maintained in these new products. We now solicit your inquiries on

Conveying Equipment

The Brown Hoisting Machinery Co.
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BROWNHOIST

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The

Smith & Winchester Mfg. Co.

SOUTH WINDHAM, CONN.

Manufacturers of

Paper Making Machinery

Paper Bag Making Machinery

The Undercut Trimmer

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Let Us Quote on Your Requirements

Paper Mill Machinery in Stock Furnished Rebuilt and Guaranteed

"Not Where Is and As Is"

COMPLETE PAPER MACHINE—80" trim. Made by Pusey & Jones, Fourdrinier, two presses, 26 dryers, one stack of calenders, reel, winder, marshall drive.

FOURDRINIER TISSUE MACHINE—One 65".

FOURDRINIER PARTS—Pusey & Jones 112", 160" equipped with new Century shake. 96" Kutter Trowbridge.

PRESS PARTS FOR PAPER MACHINES—Pusey & Jones bell crank housings and Black & Clawson swing arm housings. Press rolls 18"x110" and 30"x80".

DRYERS—Four 48"x111". One 36"x80". Two 30"x84". Nine 36"x62". Two 36"x74". Four 48"x72". Four 48"x68". One 84"x87". Eleven 42"x86". Eight 36"x62". Two 36"x48". Four 30"x39".

CHILLED CALENDERS—One 82" seven roll and one 84" nine roll made by Farrel. One 86" six roll. One 82" five roll. One 66" five roll. One 58" five roll. One 54" five roll.

SLITTERS AND WINDERS—One 84" four drum and one 72" two drum M. & W. winders with slitters. One 120" Warren. One 108" Kidder. One 46" Langston. One 40" Kidder. Two 48" core cutting machines.

BEATERS—Three 72"x42", two 54"x54" N. & W. One Holyoke 54"x80". One Dilts 62"x50" iron tub. One Jones 62"x52". One Dillon 60"x48". Two Emersons 54"x60". Three Downingtown 54"x42" iron tubs. One Jones 42"x38". Six Horne 36"x36". One N. & W. 36"x36". Two No. 2 Claflins.

JORDANS—Two Jones Imperial. Two No. 2 Dillon Improved. Two Monarchs. One large and two small Horne. One Jones Standard. One small Emerson. One Appleton Wagg Majestic. Four Stevens digesters. One Pope brushing.

SCREENS—Three 12 plate. Two 8 plate open side Packer. Two 6 plate. Three white auxiliary and one Moore & White auxiliary. One single cylinder Wandel.

STUFF PUMPS—Deane triplex 9"x8". Goulds triplex 8"x12". Goulds triplex 6"x12". Beloit duplex 6"x14". Two P. & J. duplex 8"x10". Two 6" P. & J. single plunger. Twelve 5" post stuff pumps.

REVOLVING SHEET CUTTERS—62" and 84" Moore & White. Four 60" and one 66" Hamblets. One 45", one 45" and four 80" Finlays. One 82" and 62" and 48" Clark. One 50" Hamblet diagonal.

REAM CUTTERS—Two 48" Acme. Two 48" Cranston under cut.

SUPER CALENDERS—One 52", one 45", one 42", one 36" Holyokes. One 45", one 40" P. & J. One 45" Granger.

WET MACHINES—Four 72" Bagley & Sewall hydraulic. One 58" N. & W.

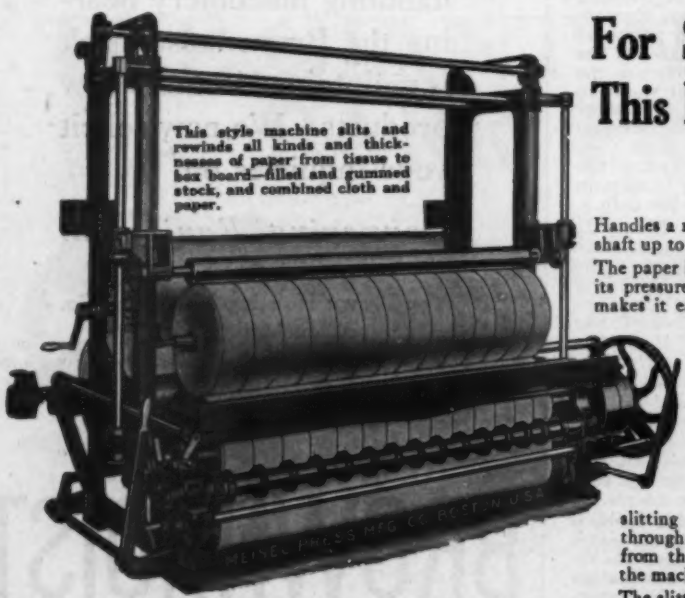
ENGINES—American Ball variable speed 120 H. P. and one 7"x10", one 10"x10". One 12"x30" Putnam.

Two Daniels Rag Cutters
One 50" Farrel Board Calender
One Manistee Hog Chipper
One Ryther & Pringle Shredder
One screw and two hydraulic Holyoke presses

We have a large number of pumps and over five hundred calender, press and couch rolls in stock

FRANK H. DAVIS COMPANY

175 Richdale Ave., Cambridge 40, Mass.


This style machine slits and rewinds all kinds and thicknesses of paper from tissue to box board—filled and gummed stock, and combined cloth and paper.

For Slitting and Rewinding This Is the BEST MACHINE Made

Handles a mill roll up to 40 inch diameter and rewinds on one shaft up to 40 inch in diameter.

The paper is rewound by the use of three rolls; the top roll by its pressure gives compactness to the rewound paper roll and makes it easy to handle the poorest grades of paper without breaking. That serious defect in some machines arising from a one-side drive for the top pressure roll is wholly overcome by our double drive which gives uniform bearing on the rewound roll. This top pressure roll is easily and quickly raised for changing the roll by turning a crank. Counterweights can be increased or decreased in weight according to requirements.

Another prominent feature of this machine is its convenience. It has a device for separating the slitting cutter shafts to facilitate threading the paper through the machine. All adjustments necessary are made from the operator's place which is at the rewinding end of the machine.

The slitting cutters which are on parallel shafts give a clean, shear cut. The cutters may be quickly adjusted to different widths from 1¼ inch upward, and are clamped to the shafts with ample bearing surface so that they always run perfectly true.

MEISEL PRESS MFG. CO.

944 Dorchester Ave. BOSTON 25, MASS.

ing chip, filled and solid news and patent coated boards. The other two machines will be running this month judging by the rate at which repair work is proceeding. It is hoped to get capacity production by March when 200 men will be employed. The mill property will be known in the future as the Uncas Board Co.

Traffic Situation Annoying

Not even in the winter of 1919-20, which was considered by the inhabitants of New England the worst from a traffic standpoint of which we have records, was the transportation services of the six northeastern states so completely demoralized as has been the case this past month of January, 1923. Every important road serving this territory has been congested with freight at a time when bad weather and car and locomotive shortage were adding to their burdens. The Boston & Maine and New York, New Haven & Hartford railroads have been the worst from the paper mill standpoint. Their succession of embargoes actually caused some mills to close and others to curtail productions materially. We can instance the case of the Haverhill, Mass., mill of the Robert Gair Co. boxboard consumers which closed for several days because of inability to get either paper stock or coal in or boxboard out. The Skowhegan Paper Co. of Maine was forced to close indefinitely because of coal and raw material shortages due to the transportation breakdown.

We could go on and list a number of important New England paper mills seriously embarrassed by the inadequate freight service, but we will merely add the case of the well-known paper mills at Fitchburg, Mass., which manufacture paper for Curtis Publishing Co. at Philadelphia. The Boston & Maine Railroad at the height of its distress effected a complete embargo of all freight except livestock, perishables and newsprint for a period of about three days. Paper had to be shipped to Philadelphia, but the B. & M. R. was deaf to all appeals until pressure was brought to bear by mill officials, which pressure was effective.

It was most difficult to get coal into New England and even more troublesome getting cars for the shipment of pulpwood from the Maritime Provinces of Canada. Even at the time we write the embargoes are so stringent that the only bituminous that can reach New England outside of that moving on special permit, is from points on the New York Central over the Boston & Maine, all other roads having embargoes of one form or another.

One of the most serious aspects of the immigration laws has been the scarcity of help in New England paper mills and of men for logging pulpwood. To mitigate somewhat the effects of the immigration policy, the Maine Senators have succeeded in obtaining permission at Washington to import 2,000 men from Canada. It is particularly essential that the spruce and fir lands ravaged by the spruce bud worm be logged this winter inasmuch as another year would render them unfit for pulp making if fires would not have destroyed much of the dead timber in the meantime. The Great Northern Paper Company with customary dispatch has set to work logging off the western branch of the Penobscot River and about Chesuncook Lake, in one township of this section there being more spruce than in any other single township in New England, 9 per cent of which is understood to be wholly killed or partly affected by the bud worm.

Important Hollingsworth & Whitney Acquisition

Possibly the news from New England that deserves to be featured this month is the purchase by the Hollingsworth & Whitney Co. of the important water power privileges owned by H. F. Eaton & Sons of Calais, Maine, on the St. Croix River. The purchase is preliminary, we are assured at H. & W. offices in Boston, to the construction of a big pulp and paper mill either on the Canadian or American side of the river. It is understood that with the purchase is included options held on several pieces of property in Duke's Ward Street, Stephen, New Brunswick.

The water powers involved are at the mouth of the St. Croix River astride the International boundary line which divides Maine from the province of New Brunswick.

The Kennebec is about the only river in Maine on which there remains a very great deal of waterpower development possible. Industries along its lines including the Hollingsworth & Whitney Co., the Great Northern Paper Co., and the International Paper Co., have joined forces to insure an uninterrupted supply of power for themselves with enough left over to attract many new industries. The project calls for the establishing of two storage basins which it is believed will

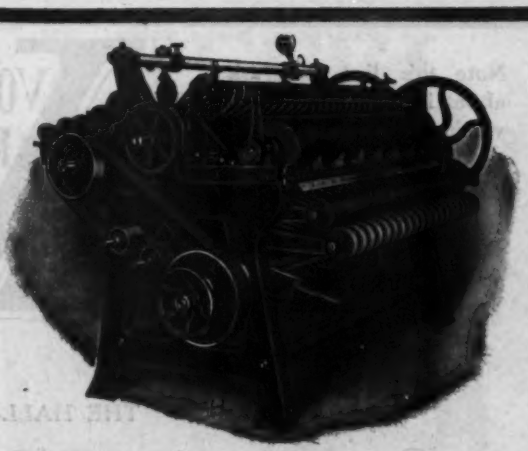
Public Sales

We have purchased 122,000 pair U. S. Army Munson last shoes, sizes 5½ to 12, which was the entire surplus stock of one of the largest U. S. Government shoe contractors.

This shoe is guaranteed one hundred per cent solid leather, color dark tan, bellows tongue, dirt and waterproof. The actual value of this shoe is $6.00. Owing to this tremendous buy we can offer same to the public at $2.95.

Send correct size. Pay postman on delivery or send money order. If shoes are not as represented we will cheerfully refund your money promptly upon request.

National Bay State Shoe Co.
296 Broadway New York, N. Y.



PAPER CUTTERS

Single, Duplex, and Diagonal

CUTTER KNIVES
PATENT TOP SLITTERS

Hamblet Machine Co.
LAWRENCE, MASS.

The Most Satisfactory Portable Elevator You Can Buy

Reversible flat and roller platform
Lever for raising and lowering top section
Quick speed lowering device
Automatic brake
Ability to lower on hoisting spindle as well as quick speed
Cut Gears
Ball bearing wheels
Rugged construction throughout

Electric machines have regular hoist type motor, line switch, reversing controller, upper and lower limits, heavy silent chain drive.

Ask for Catalog 80A

NEW JERSEY FOUNDRY & MACHINE CO., 90 West St., New York City

Note this line and ask about it. We have convincing testimonials.

From a service standpoint it is valuable. We can prove it.

VOORHEES RUBBER M'F'G CO

VOORHEES SENSATION

THE HALL-MARK OF SERVICE

"Sensation" Belt

Reduces Accidents and shutdowns, stretch and slippage, repairs and renewals, belt fastener troubles, loss of production.

"Sensation" Water Hose

The most durable, pliant and easiest handled hose in service about paper machines, blow pits, beaters, chemical houses.

"Sensation" Steam Hose

Far and away the most durable steam pressure and heat resisting hose yet produced.

MANUFACTURED ONLY BY

VOORHEES RUBBER MFG. CO.

RUB-STEEL VALVES
A Revelation in Pump Service

Main Office and Works
20 to 56 Bostwick Ave.
Jersey City, N. J.

New York
Kansas City
Montreal
Pittsburgh

double the available waterpower of the stream. The plan involves a large basin along the Dead River in the Flaggstaff district. Options on most of the properties that would be affected have been obtained. Should this be delayed the other site, under construction would be developed which is contiguous to Brassau Lake in the Moosehead Lake region.

Brown & Co. of Berlin, New Hampshire, the largest manufacturers of bleached sulphite in the United States and the largest makers of Kraft paper in the world, issued $2,500,000 of 6 per cent gold debenture bonds this month which are being used to complete the purchase of about 500,000 acres of timberland in Maine, New Hampshire and Vermont. In addition to this Brown & Co. are protected by ownership of 1,000,000 acres in fee, 168,000 acres of stumpage rights, and 2,000,000 acres of timber limits under perpetual license, all in Canada. Outside of Great Northern Paper Co., Oxford Paper Co. and Hollingsworth & Whitney there is hardly any mill in the United States better protected on pulpwood resources. Combined tangible assets of Brown & Co. and its Canadian subsidiaries are $64,000,000.

The Keith Paper Co., fine paper makers of Turners Falls, Mass., has purchased the entire control of the American Papeterie Co. of Albany, N. Y. from the United Drug Co., of Boston. This company was bought by United Drug Co., in 1920 to insure supplies for its stationery lines. During the past ten years under an exclusive concession American Papeterie has used Keith papers in the making of fine stationery lines. The purchase by Keith Paper Co., was recently negotiated. The company will be continued at Albany under the same name. The officers of the corporation are E. H. Bridge president, W. N. Tufts secretary and treasurer.

The Interstate Commerce Commission, in a decision announced recently, denied the petition for reparation made by the International Paper Co. against the Maine Central Railroad. The Commission declares that sulphite routed over a higher freight routing by the paper company in order to circumvent an embargo on a lower rate connection could not be attacked on the grounds of unreasonableness even though lower rates were subsequently effected on the higher cost routing.

The Holyoke division of the U. S. Envelope Co. has been bought by the Chemical Paper Manufacturing Co., which will use it in extending its operations. The equipment formerly in the building will be distributed to the plants of the envelope company in other cities. It is expected that machinery installation by Chemical Paper Mfg. Co. will be completed soon. The building acquired is 1,000 feet long, well located and ideally suited for the purposes of its new owners.

The recently organized Pulp & Paper Products Co. of Norwich, Conn., commenced operations on January 12th, at an old paper mill near Norwich that had been idle almost sixteen years. The new company has spent $35,000 in renovating the property and adding modern machinery. More improvements are to be made according to the president.

Generally advanced raw material costs, including coal and pulpwood, have been a factor in a rise in the price of New England made book paper. Leading New England mills quoted prices for February on a slightly higher basis, while early in the month the rag paper mills effected quite substantial advances in some cases.

Indicating the continued inability of these concerns to put their operations on a profitable basis, the city treasurer of Augusta, Maine, reports uncollected taxes of $40,000 from the Kennebec Paper Co., and the Cushnoc Paper Co. of that city. Both concerns are being run by the same trustees in bankruptcy.

The overloading of a brick vat at the mill of the Champion-International Paper Co. at Lawrence, Mass., caused the sides to give way which brought down with it two outer walls of the building, a workman being killed in the accident. This happened January 24.

The Northern Pulpwood Co. was organized at Bangor, Maine, to deal in timberlands. Its capital stock is $200,000. Its incorporators consist of Michael J. Brennan, James B. Mountaine and R. A. Brann, all of Bangor.,

The Geo. C. Whitney Co., manufacturers of paper products at Worcester, Mass., will build a six-story addition, 55x60 feet.

VEELOS BALATA BELTING

UNIFORM

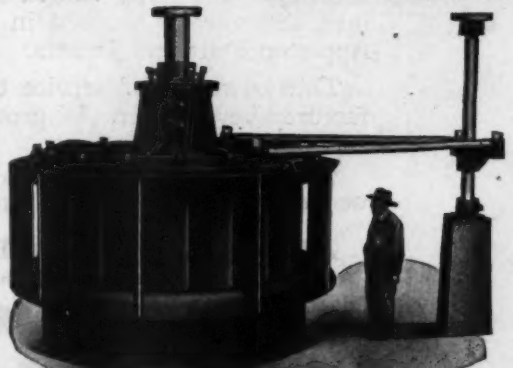
The construction of **Veelos Genuine Balata Belting** assures a uniform tension throughout the entire length of the belt. Uniformity also in width, thickness and balance insures true and smooth running pulleys.

Before leaving the factory every **Veelos Balata Belt** is thoroughly stretched to the full limit, on powerful machinery specially devised for that purpose. It is stretched while under heat, and then held under heavy tension while allowed to cool. As the Belt under this enormous tension undergoes the cooling process, the Balata Gum permanently fixes every fiber of the duck with which it has become homogeneously united, and consequently **Veelos Balata Belting** neither stretches nor shrinks. It has a greater tensile strength than any other belt.

Manheim Manufacturing & Belting Co.
Manheim, Pa.

THE STANDARD BELTING
of the World

LEFFEL
TURBINE WATER WHEELS



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Soot blowers having automatically operated valves were originated and developed by us, and are covered by patents issued and pending. Infringements of these patents will be prosecuted.

DIAMOND POWER SPECIALTY CORPORATION
DETROIT, MICHIGAN, U.S.A.

Pure Wool

spun and woven by skilled American workmen will always be used in the making of Appleton Felts and Jackets.

Thirty-two years' service to paper manufacturers everywhere is proof of Appleton superiority.

Write for quotations and additional facts on what we mean by *better service* for paper manufacturers.

APPLETON WOOLEN MILLS
Appleton, Wisconsin

Appleton
Felts and Jackets

P. H. Graham & Sons of 119-123 E. Dedham Street, Boston, has incorporated its business. P. H. Graham is president and Robert F. Graham is treasurer and general manager. The company is one of the largest packers of waste paper in New England.

Miami Valley

Middletown, O., Feb. 1, 1923.

Miami Superintendents Hold Interesting Meeting

Topics of vital interest to paper mill men were discussed at the meeting of the Miami Valley Division of the Paper Mill Superintendents' Association, held in Middletown, January 20.

Mr. George H. Harvey, of Middletown, an official of the Gardner-Harvey Paper Mill interests, and Mr. R. W. Jenkins, of the Extension Department of Ohio State University, discussed "Vocational Education in Paper Mills." The principal speaker of the evening was W. S. Rooney, of the Albany Felt Company, who talked on "The Manufacture of Felts." Mr. Rooney also told of the paper industry in Japan, with which he is acquainted through personal observations. Both of his talks were illustrated with lantern slides.

Seventy-five men were present at the meeting, which was held in the banquet hall at the Gardner-Harvey office. H. W. Server, of the Miami Paper Company, West Carrollton, Ohio, president of the Miami Valley Division, was toastmaster at the banquet.

Appreciation of the worth of vocational education for paper mill employes was expressed by Mr. George Harvey, the first speaker, who declared that he was a graduate of the "University of Hard Knocks." Lack of authoritative textbooks on the subject of paper making, Mr. Harvey said, increased the need of vocational education. The best text on paper was written by a German, declared the speaker, who also told of the efforts made by the Technical Society of the Pulp and Papermakers' Association to produce a series of five volumes thoroughly covering the subject. Mr. Harvey, who is a member of the committee producing these texts, said that the aim of the Society is to have the various angles of paper-making covered by an expert. Three of the volumes are now off the press, but $5,000 is needed before the other two volumes can be published. Towards the publishing of these volumes, the Canadian Pulp and Paper Makers' Association gave $20,000 and the Miami Valley Paper Makers' Association $2,000.

In this connection Mr. Harvey pointed out that the Canadian Association, with a proposition before it requiring financial backing, can assess individual mills to meet the required sum, whereas, in the states each mill gives as it sees fit.

Interest Shown in Educational Work

Mr. Harvey said there is a need today of "brains in the mills," and while not discounting the value of practical experience, declared that better results might be obtained by supplementing mill work with textbook study.

Many Ohio mills, including the Gardner-Harvey plants, which have two classes under way, are taking advantage of the state appropriation of $500,000 to spend on vocational training of men in the mills. This sum is not for paper mills alone, but for all industries. This phase of the vocational education movement was explained by Mr. R. W. Jenkins, who conducts classes in Middletown mills. Besides the $500,000 appropriation made by the state under the Smith-Hughes law, the federal government gives dollar for dollar with the state. He said the Ohio law next year will permit an increase in the appropriation. His plea was for paper mill leaders to take advantage of the state co-operation.

In an open forum that followed Mr. Jenkins' talk, superintendents of various mills indicated a deep interest in the vocational education movement. From the discussion it was evident that more mills will go into the question thoroughly with the view of starting classes for employes.

How Felt Is Made

In the address by Mr. W. S. Rooney on "The Manufacture of Felt," he gave the complete history of the fleece from the time it leaves the sheep's back until it comes from the mill as the completed product. Careful selection of the fleece should be first made, said Mr. Rooney, there being five different grades. After leaving the "barber shop," where the clipping is done, the wool is assorted and that coming from certain parts of the animal's body is discarded as worthless in the manufacture of felt. All foreign matter is removed from the wool in a sorting room. Wool from the shoulders, back and belly of the sheep is separated, each going into the manufacture of a different grade of felt. This is the first of twenty-two major operations in the process of manufacture, according to Mr. Rooney.

The scouring bins next get the wool, and here any remain-

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WE build all types of Rotary and Centrifugal Pumps to suit your particular needs.

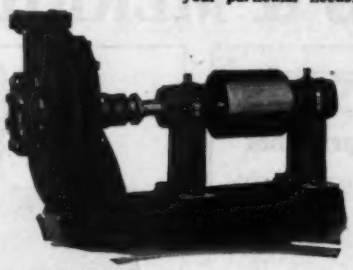

Fig. 192 illustrates Taber V Type open impeller Centrifugal Pump, built with double oil ring bearing for heavy duty. Also an auxiliary bearing within the pump proper.

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TABER PUMP CO., Buffalo, N. Y.
Builders of Rotary and Centrifugal Pumps

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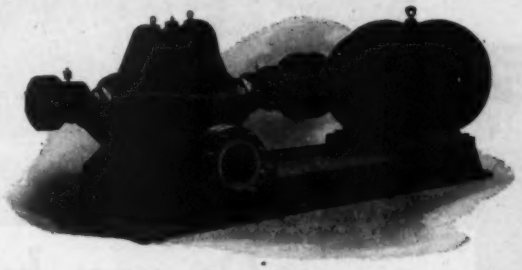
INDUSTRIAL—AGRICULTURAL—MUNICIPAL—RESIDENTIAL

A Type for Every Service

THE GOULDS MANUFACTURING COMPANY
SENECA FALLS, N. Y.

GOULDS

Aurora Centrifugal Pumps



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Aurora pumps are made in many types, to meet all conditions found in the paper mill field.

We specialize in horizontally and vertically split open and inclosed impeller, single and multi-stage and deep well turbine centrifugal pumps as well as deep well reciprocating pumps.

A card from you stating your conditions places our engineers at your service and results in a saving to you.

AURORA PUMP & MFG. CO.
Home Office and Factories, Aurora, Ill., U. S. A.

MITTS & MERRILL GRAVITY FEED SHREDDER

Reduces Paper Stock

Magazines, books, old paper and boxboard, frozen or dried pulp laps run through the Mitts & Merrill Gravity Feed Shredder are reduced to particles which hydrate readily when put into the beaters.

Built in six sizes with spouts ranging from 18" to 45" wide

Reduces Costs

Because shredding in the Mitts & Merrill Gravity Feed Shredder expedites hydration in the beaters there is considerable saving made in power. Thus we see that the shredder here illustrated reduces costs while it is reducing paper stock.

We will be glad to furnish details upon request.

We also build a 100% efficient "Hog" to reduce pulp mill bark and wood refuse

MITTS & MERRILL 1013 Tilden St. **SAGINAW, MICH.**

Do you know the cost?

DO you know the cost per hour of a Fourdrinier Machine shutdown?

Have you ever figured the cost in interest and depreciation—in loss of time and labor—in loss of production—in overhead?

The results will astonish you—you will strive for more continuous, uninterrupted operation.

One way in which every paper mill can reduce the frequency of shutdowns, is to use Fourdrinier Wires of the best quality—wires that will give the longest possible service and wear—Tyler Fourdrinier Wires.

The amount of paper a Fourdrinier Wire will produce before replacement, should be considered as well as the first cost.

Tyler Fourdrinier Wires assure you the most profitable operation and a minimum of shutdowns for wire replacements. Tyler Fourdrinier Wires are woven in all widths up to and including 250 inches.

THE W. S. TYLER COMPANY, *Cleveland, Ohio*

ing foreign substance and all grease are removed. Mr. Rooney explained that the water in the scouring bins was never permitted to reach a greater temperature than 120 degrees Fahrenheit—this in order to avoid carbonating of the wool. After being dried, the wool is blown through pipes to a six-compartment drier. The next operation corresponds to that which paper in the beater room undergoes. In a felt factory this is known as the blending room, where the felt rim is made. The wool is then dropped into a hopper, tiny hammers break it apart, each separate fibre thus receiving an emulsion treatment. In the carding room the wool passes through a series of breakers, where the fibres are evened. Leather belts then wind the fibres onto spools. The next operation finds the wool in the spinning rooms, where delicate machines, which stop automatically if a single strand breaks, thread the fibres onto bobbins. The strands are next placed on a spinning frame, conveyed to a dresser machine and then wound on a beam. It is now ready for the looms. After the felt has been woven, inspection follows and the completed felts are joined, when necessary. In the finishing room the felts are immersed in a chemical solution and shrunken to various sizes. The felt is then washed, dried and another inspection is made. Treating the completed product with a "moth preventative" is generally the last step before the felt goes to the shipping room.

The newer paper mills in Japan, according to Mr. Mooney, who also discussed various phases of the paper industry in the kingdom of the Mikado, are as modern and as up-to-date as many in the United States. One company in Japan, the speaker said, has forty-two mills operated by water power, and equipped with electrical machinery. Many of the paper machines are built in the states.

At the close of his talk, Mr. Rooney answered many questions concerning the topics he had discussed.

The next meeting of the Miami Valley Division will be held in February at the Hotel Manchester, Middletown. "Waste In Paper Mills" will be the subject at this meeting, the exact date of which has not been set yet.

List of Those Present

Following is a list of paper mill men who attended the meeting:

The Gardner-Harvey Paper Company: George H. Harvey, R. B. Gardner, W. H. Swan, Tom Harvey, John J. Hain, E. H. Butterfield, A. X. Schwebel, Wm. W. Rettig, S. J. Evans, Wm. Lickert, Wilbur Crorit, William Jackson, John Ditmeyer, H. C. Kempf, Robert Morris, Arlo Weber, William Jennings, Alfred Bieler, Charles A. Skeen, Jack Smith, Jr., Jack Smith, Sr., W. J. Brooks, H. F. Bennett, W. M. Kitchen, R. J. Murback, Harry D. Hensey, Elmer H. Augspurger, Llowel E. Longstreth, R. O. Brosius, Walter B. Hadley, Robert L. Haskins, Joe Taylor, Charles H. Hoskins, C. R. MacDonald, and B. M. Bishop.

The Colin Gardner Paper Company: Edward Geran and Edward L. Branson.

The Shartle Brothers Machine Company: Homer D. Martindale and C. R. Crawford.

The Shartle and Bevis Machine Company: R. C. Bevis.

The Albany Felt Company: Wayne G. Davis, E. R. MacLaren and W. S. Rooney.

The Miami Paper Company, West Carrollton, Ohio: H. W. Server, A. A. Miller and John MacMurray.

Ohio State University Extension Department: R. W. Jenkins.

The Champion Coated Paper Company, Hamilton, Ohio: Louis H. Frechtling, Roy W. Maggart, Jack Mahoney, F. A. Karls, C. C. McKasson, G. S. Martindale, and Homer C. Ferguson.

The Crystal Tissue Paper Company, Amanda, Ohio: J. M. Cathcart.

The Black-Clawson Company, Hamilton, Ohio: William T. Schenck and Allan Hyer.

The Hagar Straw Board Company: Wilson W. Galloway, H. G. Funsett, David Stratlinger and R. W. Gowdy.

The Beckett Paper Company, Hamilton: Homer H. Latimer.

The Ohio Paper Company, West Carrollton, Ohio: Adam Ritz.

The Auglaize Box Board Company: L. T. Murphy.

Paper Container Division of the Postum Cereal Company: E. S. Branson.

The Manhattan Rubber Manufacturing Company: Charles E. Joyce.

Rockdale, Ohio, Mills: E. T. Thompson.

The Chicago M. & L. Company: W. M. Cramer, R. F. Englehardt and A. J. Knowls.

Incorporation of the Crystal Waxing Company, of Amanda, Butler County, Ohio, was announced here January

EASTWOOD
Wire Mfg. Co.

Fourdrinier Wires
Cylinder and Washer Wires

Belleville, New Jersey
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WE ALSO MANUFACTURE

Valves, Unions, Cocks, Fittings, Digester Parts, Castings, etc., for Sulphite Mills from Our Perfection Bronze

E. M. CROSS MACHINE CO.
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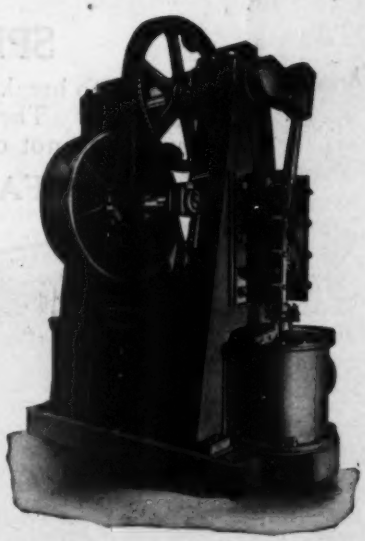
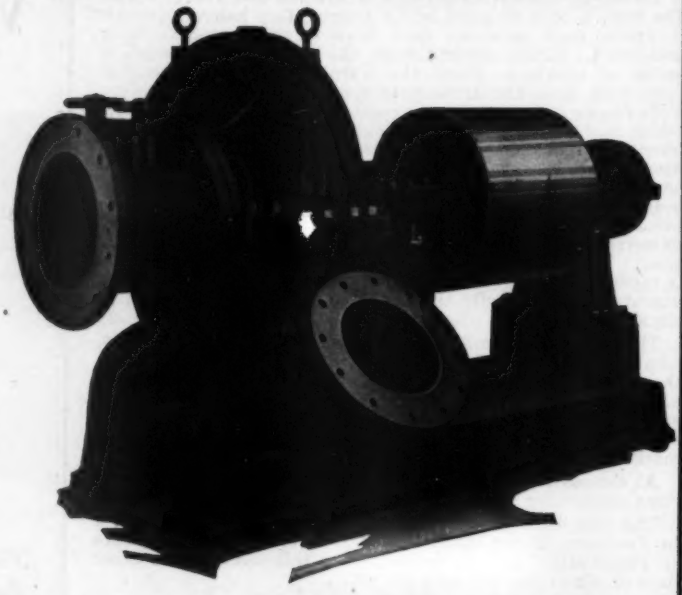


Machinery Specialists
for Pulp and Paper Mills
Including Vacuum and Centrifugal Pumps

You Will Find Every Desirable Feature in These Pumps—Just Check Them Off

1. Upper half casing can be removed for cleaning, inspecting or repairs without breaking gasket or disconnecting pipes.
2. Hand hole covering in filler piece permits cleaning impeller.
3. Casing is mounted directly on base to assure rigidity.
4. Floor space is saved by having discharge 45° up from horizontal.
5. All parts are made extra heavy and of ample proportions to withstand strains and wear.
6. Water cooled stuffing box and thrust bearings.
7. Ring oiled, babbitt lined shaft bearing.
8. Space between pulley and bearings keeps oil off belt.
9. Special open or closed type impellers that won't clog.
10. Suitable for pulley or direct driven at speeds that permit economical motors.

Further details will be supplied by Dept. No. 27



BUFFALO STEAM PUMP COMPANY, Buffalo, N. Y.

"Buffalo"

SPRAY NOZZLES

are best to break up the foam on the wet end of paper machines. The spray is soft and uniform, and nozzles do not clog.

BUFFALO FORGE COMPANY
Buffalo, N. Y.

24. The incorporation was for $100,000, and is the result of the recent consolidation of the Crystal Tissue Company and the Shelby Waxed Paper Company, of Shelby, Ohio. The incorporators were named as Z. W. Ranck, president of the Crystal Tissue Company, and C. O. Sellen, formerly sales manager, and W. H. Muchmore, formerly manager of the Shelby Company.

The consolidation involved the bringing from the Shelby plant to the Crystal plant certain machinery and equipment with which to wax the tissue that was already being manufactured at the Crystal mills. Under the arrangement the new waxing company has simply leased floor space from the Crystal company.

The present daily output of the Crystal Waxing Company, which has been operating but a few days, is fifteen tons. The equipment at the present time consists of three sixty-inch machines. A larger machine is to be added soon, according to company officials.

John Harding, of Franklin, is now in charge of the Detroit sales office of the Nashua Gum & Coated Paper Company. Mr. Harding's territory includes parts of Ohio, Michigan and Indiana.

Fox River Valley

Green Bay, Wis., Feb. 1, 1923.

One Billion Fruit Wrappers

Although the making of fruit wrappers is only a small specialty in the tissue industry it may be surprising to some even in the paper manufacturing business to know what volume has been attained by one Green Bay mill. The Hoberg Paper and Fibre Company manufactures fifty carloads of plain and printed fruit wrappers annually, according to production figures just announced. Each car contains 20,000,000 fruit wrappers, making a total produced in the Green Bay mill of 1,000,000,000. The wrappers are shipped to all the important fruit producing centers in the United States and are used to wrap oranges, lemons, grape fruit, apples and even potatoes. Approximately 9 acres of floor space in the Green Bay mills of this company are devoted to the making of tissue.

In addition to fruit wrappers the Hoberg mills produce daily 1,500 cases of folded towels, folded toilet and roll toilet paper and 8,000,000 paper napkins. The same plant produces wrapping paper and some news print.

Stockholders of the American Tablet Company of Green Bay at their annual meeting on Jan. 27 elected directors and authorized an increase in capitalization from $50,000.00 to $100,000.00. The additional capital is to provide for expanding production. The plant now has a capacity of 75,000 to 100,000 school tablets a day, depending on size. It sells through jobbers and maintains offices in Los Angeles, Dallas, Chicago, Kansas City and St. Louis. A. D. Race was re-elected president. Recent revisions in freight business are expected to stimulate business in the coast territory.

The annual meeting of the Consolidated Water Power and Paper Company was held in the company offices in Wisconsin Rapids on Jan. 24. Reports read at the meeting show the company had a most successful year. About 40 stockholders attended. Directors were re-elected, the board consisting of George W. Mead, Isaac P. Witter, George P. Berkey, R. L. Kraus, and T. W. Brazeau. The directors re-elected officers as follows: President, George W. Mead; vice presidents, R. L. Kraus and George P. Berkey; treasurer, Isaac P. Witter; secretary, E. B. Redford.

William E. Eibel, general manager of the Peshtigo Paper Company of Peshtigo, has resumed his work, after having been incapacitated for ten days with rheumatism.

Announcement was made at a meeting of stockholders of the Peshtigo Paper Company, held Jan. 30, in Marinette, that arrangements had been completed for the financial requirements of the company which is a consolidation of the Peshtigo Pulp and Paper Company and the Peshtigo Fibre Company. John G. Sutherland is president. Election of officers was postponed until June.

Employees of the Kimberly-Clark mill at Kimberly have entered into a three-cornered safety competition with the company's mills at Niagara, Wis., and Niagara Falls, N. Y. The contest will continue 60 days and is for a silver cup now held by the Niagara, Wis., mill. Winning the cup three times

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All Kinds and Constructions for Every Purpose

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Wooden Tanks, Tubs, and Vats

Wooden Penstocks, Acid Towers, etc.

Inbuilt strength and durability are features of all products manufactured by this company. Handy pocket size catalog mailed upon request.

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Are Good After 30 Years of Service

Many of our tanks built of Genuine Red Gulf Cypress are still on duty after giving more than thirty years of satisfactory service.

We carry no tanks in stock—all are accurately made to order for your special purpose.

Our Slogan—"Satisfied Customers Only"

Write today for information that should be in your possession. This is a part of our Co-operative Service.

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500 BAKEWELL BLDG.

THE HAUSER-STANDER TANK CO.
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TRADE JENKINS MARK Jenkins Bros

A full opening nearly in line with the pipe

This Jenkins Iron Body Y Valve, fitted with Jenkins Disc, offers practically no resistance to the passage of steam or fluids.

It is a valve that is highly satisfactory in handling thick, heavy fluids.

Also it is a dependable boiler blow-off valve.

Jenkins Valves are always marked with the "Diamond"—their long life means REAL economy.

Sectional View, Fig. 296, Jenkins Standard Iron Body Y or Blow-Off Valve.

JENKINS BROS.

New York Philadelphia
Boston Chicago
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FACTORIES:
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Elizabeth, N. J.;
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POWELL VALVES

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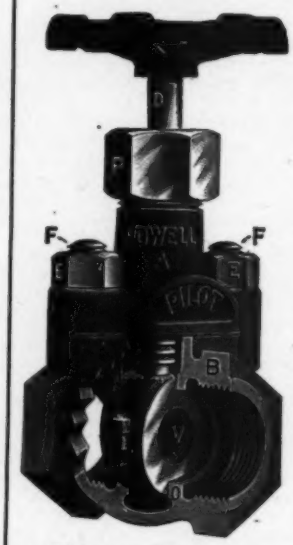


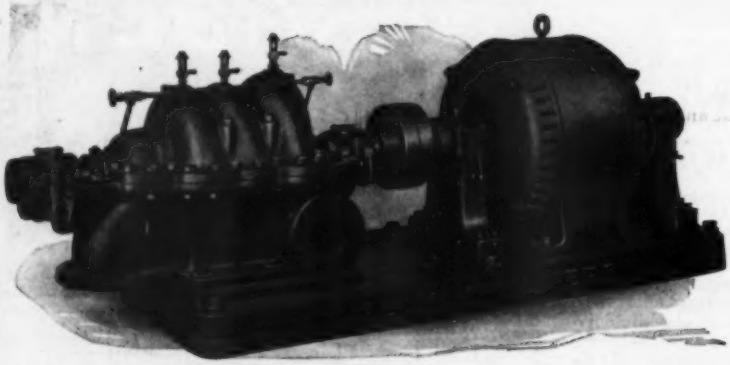
All iron or iron body with steam bronze trimmings. Simple in construction.

Economical and Reliable

Avoid disappointment in Valve Service by specifying POWELL VALVES

THE WM. POWELL CO.
Cincinnati, Ohio

Write for descriptive Circular



SIMPLICITY

Contributes much to the good record made by Allis-Chalmers Centrifugal Pumping Units.

Bulletin 1632E Sent on request

For example a 3" 5 stage pump in operation in a paper mill has only been packed once in two and one-half years. This pump is balanced by the Allis-Chalmers automatic hydraulic balancing device (which is very simple) and when this pump was opened for inspection the original tool marks still showed on the balance disc.

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
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ALLIS-CHALMERS MANUFACTURING COMPANY
Milwaukee, Wisconsin, U. S. A.
District Offices in All Leading Cities

ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
Condensers

in succession will entitle either of the three mills to permanent possession.

Officials of the Thilmany Pulp and Paper Company of Kaukauna, Wis., have confirmed a report that the newly organized bag department is to be moved to another city, but the new location has not been announced. The new department was organized last summer and employs between 50 and 60 girls.

A bond issue of $3,000,000 was voted by stockholders of the Nekoosa-Edwards Paper Company at the annual meeting on Jan. 18 the money to be used for enlarging the plants and purchase of two new paper machines, one for the Port Edwards plant, and one for the mill at Nekoosa.

Announcements sent to stockholders of the Northern Paper Mills at Green Bay are in the midst of an extensive rebuilding campaign and with the alterations already underway is expected to be thoroughly modern. The company is operating six paper machines.

The Victory Bag Company of Marinette, with 200 employees, is celebrating its 75th day without an accident, and hopes to break its record of 102 days without a mishap in the plant. This is close to the Wisconsin record for plants of this size.

Relief for Casein Situation

A larger quantity of Argentine casein is reported to be coming forward than was received during the fall months.

The Argentine production of casein for a time was diverted to Europe, causing a serious shortage in the American market, particularly as the American manufacturers, despite a protective duty which they had previously not enjoyed, turned to production of powdered milk instead of casein.

The imposition of a duty upon Argentine casein resulted in an immediate drive by European consumers to secure entire South American production, or as much of it as possible, and large quantities which normally would have been shipped to the United States were turned to Europe, in the belief of the Argentine producers that the tariff would destroy their market in this country.

As time went on, however, it was found that American demands would be such as to warrant a continuous shipment of the Argentine product to this country, which is a market more favored by the South Americans than Europe, and large shipments will soon be under way. There will continue to be a shortage probably, for some time to come, but the immediate pressure has been so far relieved that it is now possible to get casein at the high prices now prevailing. For a time it was impossible to get casein at almost any price, and all quotations were purely nominal.

Meanwhile, the work of the coated paper manufacturers for the securing of a lowering of the duty has proceeded. It seems certain that the United States Tariff Commission will grant a hearing. A letter has recently been received by Martin Cantine, chairman of the special committee of the Coated Paper Manufacturers which has been working for this hearing, indicating the lines of evidence which the commission will expect, when a hearing on the casein situation is held.

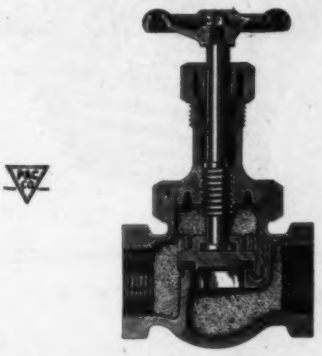
Dr. Baker, executive secretary of the American Paper and Pulp Association, has, in anticipation of such a hearing, notified other trade organizations which are working with the coated paper manufacturers of the situation, and suggested that they be prepared to appear either by briefs or by personal appearance as witnesses when the Tariff Commission has its hearing.

Electro Bleaching Gas Company, manufacturers of liquid chlorine, announces the advancement to general sales manager of Mr. W. J. Jacobs, succeeding Mr. D. K. Bartlett, as of January first. Mr. Jacobs is a chemical engineer of extensive training and has done much to advance the use of liquid chlorine in the many industries in which it is now used. Those who know him personally or are familiar with his work will wish him well in the increased scope of his activities and responsibilities. His office will continue to be at the main office of the company, 18 East 41st Street, New York.

Keenan Devoting Time to Coming Exposition

Thomas J. Keenan, known to the entire paper industry through his long years of work with the Technical Association, and also from his contact with the industry as editor of "Paper," has retired from the editorship of "Paper," to give his entire time to the coming Paper Industries Exposition. Mr. Keenan was originally named as a member of the Advisory Committee from the Paper Industry for the Ex-

PRATT & CADY VALVES

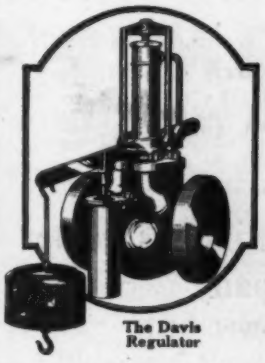


IT IS real economy to install Pratt & Cady Bronze Union Bonnet Renewable Disc globe and angle valves. It is so easy to replace parts subject to wear that you are sure to take advantage of this feature.

P & C folder No. 2 describes this valve in detail. May we send you a copy?

Reading Steel Casting Co., Inc.
Pratt & Cady Division
General Sales Office: Bridgeport, Conn.

Boston, Charlotte, Chicago, Cleveland, Detroit, Hartford, Houston, St. Paul, New York, Philadelphia, Pittsburgh, San Francisco



The Davis Regulator

If you use steam
you need the Davis Regulator

THERE is a great deal of new equipment that might be installed in every power plant that would effect great economies. But much of it is very costly—and appropriations can't stand its installation.

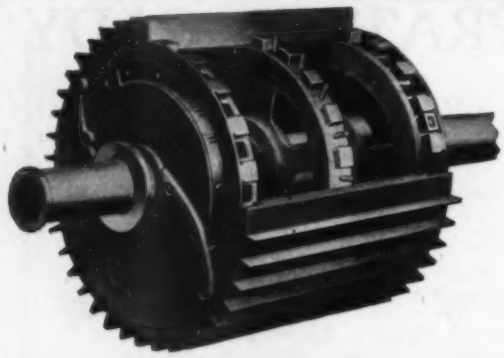
The Davis Regulator is an inexpensive device that often brings back its cost the first year—and the Davis will make great savings WHEREVER STEAM IS USED. By reducing high pressure steam to lower pressures it insures economical and efficient operation of engines, fans, heating systems and processes.

How the Davis principle—tested by time since 1875—assures utmost regulator reliability is the story of the new catalog, which also describes a complete series of better valve specialties. Ask the G. M. Davis Regulator Co., 414 Milwaukee Ave., Chicago, for your copy.

Davis

Pressure Regulators
Water Controlled Valve
Back Pressure Valves
Balanced Valve
Stop and Check Valves
Flow Regulator
Fluid Level Controller
Float Valve
Steam Trap
Non-Return Valve
Pump Stop Valve
Emergency Stop Valve
Pump Governors
Water Relief Valve
Exhaust Relief Valves

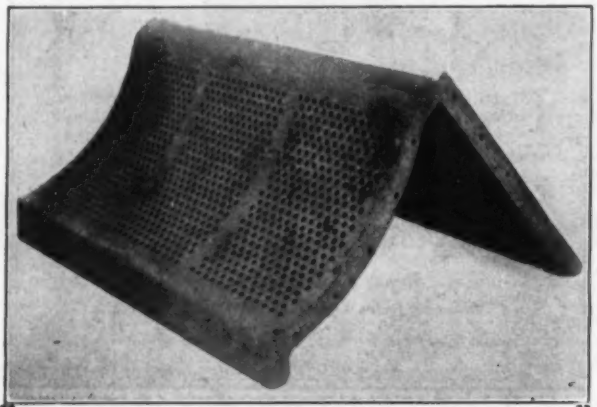
DAVIS VALVE
STEAM SAVERS SINCE 1875
SPECIALTIES



Dayton Globe Iron Works
DAYTON, O.

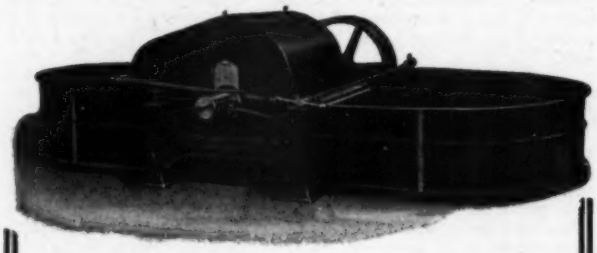
We manufacture Beating and Washing Engines, Head Gates, Hoists and Gears.

Our Wedge Type Bandless Roll made of semi-steel with special alloy bars is practically indestructible.



Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

The Shartle Continuous Beater Company
MIDDLETOWN, OHIO



"Dayton" Beating Engines are Built for Heavy Duty

Dayton Beater and Hoist Co.
DAYTON, OHIO

WE-FU-GO AND SCAIFE
WATER
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES
WM. B. SCAIFE & SONS CO., PITTSBURGH, PA.

position, but has, because of his experience in the paper industry, been secured by the management of the Exposition to give his entire time to aiding the management in the work of planning for the big paper show.

Mr. Keenan was one of the organizers, and for many years secretary-treasurer, of the Technical Association of the Paper and Pulp Industry, and in securing him the Exposition management has made a notable addition to the staff which will handle the Exposition, the week beginning April 9.

Personals

F. C. Strype, well known paper dealer of 320 Broadway, New York, recently returned from a trip to Europe where he visited in England and on the Continent. Mr. Strype will in the future have the sole representation in the United States of Robert Fletcher & Son, of Stoneclough, near Manchester, England, manufacturers of high grade cigarette and all other kinds of tissue papers.

It was given out today by L. L. Alexander, President of Nekoosa Edwards Paper Co., Port Edwards, Wis., that L. E. Smith, for many years Sulphite and Sulphate Superintendent of the company's plant at Nekoosa, has been promoted to the position of General Superintendent of Sulphite and Sulphate Mills of the Nekoosa Edwards Paper Co. His new duties will commence immediately.

Thomas Tucker has resigned as superintendent of the Crescent Paper Company at Marseilles, Ill. He feels that he has passed the age of active service and is ready to take life a little easy. As soon as he disposes of his property at Ottawa, he, with his wife and daughter, will move to California. His successor at the Crescent Paper Company will be George W. Sterrett.

Mr. Royal E. Terhune has been placed in charge of Northern New Jersey sales territory of the Uehling Instrument Company, Paterson, N. J. Mr. Terhune was formerly associated with the Uehling Laboratories and is therefore well qualified to co-operate with power plant operators on the important subject of power plant economy.

Frank E. Brophy, for the past 15 years connected with Vernon Bros. & Company, paper dealers of New York City, has resigned to join the selling staff of the Domestic Mills Paper Company, of New York, for the purpose of developing the coated, book paper, bond and board division of the latter company.

Michael Ludwig, superintendent of the Chillicothe, Ohio, plant of the Mead Pulp and Paper Company, has been appointed to supervise the installation of a new 140 inch machine in the plant of the Mead Fibre Company at Kingsport, Tenn.

F. C. Clark manager of the Pejepscot Paper Co., mill at Brunswick, Me., in an address in the town hall at Brunswick recently, prophesied a good business year, and held out hopes of an enlarged paper mill.

Mr. A. Z. Smith, for 26 years superintendent of the Hagar Straw Board and Paper Company at Cedarville, Ill., has resigned. H. G. Funsett has been appointed to succeed him.

E. P. Lowe of the Falulah Paper Co., has removed his residence to California where he will go into the oil business having purchased oil producing properties in Ventura county.

Patrick Reynolds, for years employed by the International Paper Co. at the Livermore Falls Mill was recently made superintendent of the Skowhegan Paper Co., Skowhegan, Maine.

Obituaries

The death of Mrs. Carrie Giles Carter, wife of James Richard Carter, treasurer of Carter Rice & Co. Corp. of Boston, elicited the sympathies of a multitude of friends for the veteran paper man. A man of more than 60 years' experience in the paper business, Mr. Carter is a national figure both to merchants and manufacturers, and his talented wife has had more than local fame in the authorship of two books dealing with the religious life of her father. Mrs. Carter is survived by three sons and a daughter. Two of the sons, Winthrop and Eliot, being associated with the Nashua

FLY BARS
of BRONZE
for Beaters

Will outlast steel bars 5 to 1
Will not discolor paper stock
Are tougher and stronger than steel
Will not corrode
Will save money in operating costs
Tensile strength, 75,000 lbs. Yield Point, 38,000 lbs. Elongation, 20% in 2 in.

Hy-Ten-Sl Bronze Bars for Jordan Engine Fillers

Outwear anything on the market, by a wide margin.
This metal is as strong as Nickel Steel.
Tensile strength, 110,000 lbs. Yield point, 60,000 lbs. Elongation, 12% in 2 in.

AMERICAN MANGANESE BRONZE CO.
Holmesburg—Phila—Pa.
NEW YORK OFFICE: Room 806, 59 Pearl Street

SIMONDS
Saw & Steel Co.
SUCCESSOR TO
Simonds Manufacturing Company

Please change your records accordingly and use the name of the new Company from now on.

FACTORIES
Fitchburg, Mass. Chicago, Ill. Montreal, Que.
Lockport, N. Y.

BRANCHES
New York, N. Y., Detroit, Mich., Memphis, Tenn.
New Orleans, La., San Francisco, Cal., London, Eng.
Portland, Ore., Seattle, Wash., St. John, N. B.
Vancouver, B. C.

"ELECTRO" STEAM BOILER
(Kaolin Development)
100 KVA (10 B.H.P.) to 34,000 KVA (3400 B.H.P.) in daily use.
Larger or smaller units supplied.
ELECTRIC FURNACE CONSTRUCTION COMPANY
968 Chestnut St. Philadelphia, Pa.

Steel Plate Construction
Steel Storage Tanks, Blast Furnaces, Gas Holders
Steel River Barges and Plate Work of all Kinds
Steel Transmission Towers
RITER-CONLEY COMPANY
General Offices, Pittsburgh, Pa.

BROWN-WALES CO. sELAw IRON & STEEL
"Headquarters in New England" for **IRON AND STEEL and Kindred Materials**
Immediate Delivery
Distributor for Armco Iron
BROWN-WALES CO., Boston 9, Mass. 55 Church St., New Haven 261 Broadway, N. Y. C. Bangor, Maine
BARS — SHEETS — STRUCTURALS

Pickles' Patent Automatic Steam Regulator FOR Paper Making Machines
Which absolutely control the drying of the sheet. Installed on sixty days' trial
W. F. PICKLES Buckland, Conn.

A Test Costs You Nothing
For 60 days you can use
"SHURFLO" *Wick Feed* **OIL CUPS**
without obligating yourself in the least. If they do not satisfy, we pay charges. Try them on your worst bearings and we're sure that they will save at least a third of your present lubrication costs.
See for yourself. Write today.

HUNTER PRESSED STEEL COMPANY
600 Pierce Street Lansdale, Penna.

Double Stroke Deep Well Head Size 3L, Arranged for Belt Drive.
Write for Bulletin 27-C

A. D. COOK, Inc.
Lawrenceburg Indiana
Manufacturers of Single and Double Stroke and Double Acting Steam and Power Deep Well Pumps, Working Barrels, Rods, Foot Valves, Strainers and a Full Line of Water Well Supplies.
The accompanying half tone shows the design of our Double Stroke Deep Well Power Head, which is the most efficient Type of Deep Well Plunger Pump.

Technical Association Papers, Fifth Series
This volume of 176 pages is one of the most valuable contributions to the literature of pulp and paper manufacture yet issued. The contents include the following articles besides a directory of the officers and members of the Technical Association and the list of committees:
The Power Plant of the Paper Industry, by A. G. Darling and H. W. Rogers.
A System of Records to Maintain Uniformity of Basis Weights of Paper, by Parker K. Baird.
Hydrating Machinery for the Paper Mill, by George L. Bidwell.
Modern Lighting for Paper and Pulp Mills, by J. H. Kurlander.
Some Factors Influencing Yield and Strength of Pulp Cooked by the Soda Process, by Martin L. Griffin.
Sedimentation Control of Groundwood, by W. A. Munro.
The Efficient Production of Mechanical Pulp, by Adolph F. Meyer.
The Drying of Paper, by M. B. Littlefield.
The Electric Steam Generator, by Horace Drever and Frank Hodson.
Recovery and Its Control, by George K. Spence.
Relative Efficiency of the Automatic Magazine Grinder as Compared with the Pocket Type Grinder, by John J. Case.
Stamso—Cotton Linter Pulp, by Stewart E. Seaman.
Analysis of Reclaimed Cooking Acid for Sulphite Mills, by Gösta P. Genberg.
Analysis of the Raw Sulphite Acid, by Dr. Rudol Sieber.
Concerning Lignin and Lignin Reactions.
Contribution to the Knowledge of the Constitution of Spruce Wood Lignin.
Contributions to a More Exact Knowledge of the Chemical Constitution of Spruce Wood. Three articles by Dr. Peter Klason, translated by W. E. B. Baker and Carl L. Fineman, by special permission of the author.
Use of the Continuous Centrifugal, by J. R. Kessler and G. N. Collins.
The Chemistry of the Sulphite Process, by R. N. Miller and W. H. Swanson.
Standard Methods of Testing Materials, by N. F. Becker.
Color Effect of Rosin Size Emulsion on Finished Product, by C. H. Kent.
Sulphur in Sulphite Waste Liquor, by George Barsky.
Producing Bleach Liquor with Liquid Chlorine, by S. W. Jacobs and H. P. Wells.
A New Idea in Chip Breaking, by A. D. Wood.
Fuel Economizers in Paper Mill Operations, by George E. Williamson and G. C. Derry.
A New Idea in Chip Breaking, by A. D. Wood.
Bibliography of Paper Making for 1921, by Clarence J. West.
Proceedings of the Annual Meeting, April, 1922.
Sectional Meeting on Dyestuffs.
Sectional Meeting on Paper Testing.
Sectional Meeting on the Drying of Paper.
Discussion of Various Papers Presented at the Convention.
The volume described is obtainable, on order, from the Technical Association of the Pulp and Paper Industry, 18 East 41st Street, New York City, at $3.00 per copy.

Gummed and Coated Paper Co. of Nashua, N. H., which is closely allied with Carter Rice & Co. The third son is connected with the company in Boston.

Walter R. Jones

Walter R. Jones, credit manager for D. S. Walton & Company, one of the oldest and best known paper jobbing concerns in New York City, died on January 30 in a sanitarium at Kingston, N. Y. Mr. Jones was 62 years old, and lived at 12 Spencer Place, Brooklyn, N. Y.

William La Forest Rogers

William Rogers, former division superintendent of the Great Northern Paper Company died at the home of his son, William, in Braintree, Mass., on January 13.

William O. Hill

William O. Hill, for years superintendent of the S. D. Warren Co. rag department, died early this month at his home in Cumberland Mills, Me.

Miscellaneous Mill News

A new plant has recently been completed at Leesburg, Fla., for the purpose of making paper of saw grass. Grass Fiber Pulp and Paper Corporation is the name of the new concern and it is reported that their experiments to date have been altogether satisfactory. The development of this new industry promises to open a new and a vast supply of raw material for paper making to supplement the rapidly decreasing forests.

Final steps were taken in the sale of the bankrupt Mullen Brothers Paper plant at St. Joseph, Mich., before Circuit Judge Chas. E. White at Benton Harbor on January 18. After much keen bidding the plant, together with raw materials on hand, wharf property, the Mullen equity and accounts receivable, were sold to Francis J. Hughes at a total of $93,000. It is reported that the plant will be put into operation at once.

The Ertle Paper Company is the name of an organization incorporated in Ohio, to manufacture bond, ledger, envelop and writing papers. J. A. Ertle and O. W. Seastrom are named as incorporators. Incorporation papers were filed at Columbus on January 12, the company being incorporated for $200,000. While it is not definitely known, it is very likely that the new plant will be located at Zanesville, Ohio.

The National Biscuit Company has purchased the stock of the Crescent Paper Company at Marseilles, Ill. Arrangements have been made by the purchasers to secure the services of R. F. Knott, president of the Crescent Paper Company, also J. A. Kelse, vice president and F. E. Smith, secretary and treasurer. The property will be formally transferred on April 1.

It is stated that the International Paper Co. is contemplating building a $7,000,000 water power plant at Grand Falls, N. B. Also that if this is not done the Brunswick government will take hold of the project. The rumor states that new paper and pulp mills are to be built at this point.

The Monroe Paper Co., Monroe, Mich., whose plant was partly destroyed by fire recently, will shortly erect a number of new buildings including an engine room, beater room and offices. They will need considerable new power plant equipment, mill equipment and office equipment.

Price Bros. Co., head office Quebec, Canada, is said to be planning a three years' campaign of building which will eventually give them an output of 900 tons of newsprint daily. It is expected that the output will be 500 tons by January of next year.

The Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis., is considering the addition of a new paper machine at either their Stevens Point or Byron, Wis., mill, along with other necessary machinery and equipment.

The J. S. Rogers Co., Philadelphia, has been awarded a contract for the erection of a new 5-story building by the Philadelphia Paper Co. The cost is estimated at $225,000.

Quality Guaranteed

The Smallwood-Low Stone Co.
Lisbon, Ohio
U. S. A.

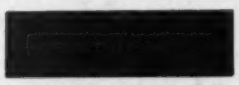
Remember
WM. A. HARDY & SONS
FITCHBURG, MASS.
Originators and Oldest Manufacturers
OF THE
Cast Bronze Screen Plate
ALSO SPECIALIZE IN
Acid Resisting Digester Parts

SCREEN PLATES *and*
DANDY ROLLS

Watermarking a Specialty

Central Manufacturing Co.
The Quick Service House
KALAMAZOO MICHIGAN

UNION SCREEN PLATE CO.
Fitchburg, Mass., U. S. A. Lennoxville, P. Q., Canada



UNION BRONZE SCREEN PLATES
(Best phosphorized Cast Metal)
Old Plates RECLOSED and RECUT to accurate gauge
UNION BRONZE SCREWS for Screen Plates
Immediate Delivery of the Largest Orders. Satisfaction Guaranteed
The Witham Screen Plate Fastener, Patented
THE ORIGINAL THE BEST

Fitchburg Duck Mills

ESTABLISHED 1844

FITCHBURG, MASS.

MANUFACTURERS OF

STANDARD AND MULTIPLE

DRYER FELTS

English Weave in Two, Three, Four, Five and Six Ply—60 Inches to 176 Inches in Width

Fine Faced Felts for Fine Papers. Absolutely no felt marks in paper. TRIBUNE Three Ply Felts for Coarse Papers.

Hamilton Top Felts

run until worn out, with less trouble of "picking" on machine than any other make of top felts can show. A trial is invited

SHULER & BENNINGHOFEN

HAMILTON, OHIO

LOCKPORT Felts

EXCLUSIVE MAKERS OF

Paper Makers' Felts

Have You Run Them?
If Not, Why Not?

Are You Interested in Accurate Running Felts?

Give Us a Trial
Get Authentic Information
Ask the Men Who Run Them

Yours for service

LOCKPORT FELT CO., Newfane, N. Y.

THE WATERBURY FELT CO.

SKANEATELES FALLS

New York

FELTS and JACKETS

Top and Bottom Wet Felts for board machines, with all the qualities requisite to insure long life and continuous production.

They Satisfy

STOWE & WOODWARD CO.

Newton Upper Falls, Mass.

Makers of Rubber Covered Rolls

Maximum Resiliency WITH Minimum Softness

Long Life

The Oak Cliff Paper Mills, Inc., near Dallas, Texas, has plans for additions and improvements. A new plant will be erected for the manufacture of fiber and corrugated board and kindred products.

The Southern Paper Co., Moss Point, Miss., has plans in hand for both new paper and pulp mills. They will need complete equipment. Geo. F. Hardy, 309 Broadway, New York, is the engineer.

It is reported that there is to be considerable new building and another big machine added to the plant of the Paraffine Cos., Inc., Antioch, Cal., to make corrugated strawboard and egg-filler stock.

James L. Carey of Chicago is the architect for the new plant of the Bogalusa Paper Co., Bogalusa, La., which will erect a new paper mill and additions to their pulp mill.

The Bastrop Pulp & Paper Co., Bastrop, La., is planning on additional machinery to manufacture kraft papers, and will also build a new boiler house.

The Donnaconna Paper Co., Donnaconna, P. Q., is making plans to double the capacity of their newsprint mill from 50 to 100 tons daily. Considerable new machinery will be needed.

The new addition to the Washington Pulp & Paper Corporation, Port Angeles, Wash., started operation on the 20th of last December. It is now operating at full speed.

The Hummell-Ross Corp., Hopewell, Va., which company is now building a kraft paper mill, will, it is reported, soon double the capacity of their pulp mill.

The Hinde & Dauch Paper Co., main office at Sandusky, O., contemplate the erection of considerable new buildings at their plant at Fort Madison, Iowa.

Royal Paper & Bag Co., Allentown, Pa., has plans for the rebuilding of their plant which burned. Three stories, 60x230 feet will be built.

The United Paper Co., Atlanta, Ga., makers of fruit wrappers and other paper products, will build a large six-story plant at that point.

The Stamsocott Co., Hopewell, Va., has work under way to considerably increase the output of their plant for cotton fiber pulp.

The Kemper-Thomas Co., Park and Floral aves., Cincinnati, O., will add another large building to their plant making paper specialties.

D. D. McPhail, Kelso, Wash., and associates, are organizing to build a paper and pulp mill near Victoria, B. C. The first unit will cost more than $500,000.

The Uncas Paperboard Co., organized for $1,500,000, will make improvements and add machinery at their plant at Norwich, Conn.

The Everett Pulp and Paper Company of Everett, Washington, will increase their capital stock from $672,000 to $2,400,000.

The Filer Fibre Co., Filer City, Michigan, is building a new plant. Machinery will be installed in the near future.

The Garrett-Buchanan Co., 18 S. 6th St., Philadelphia, Pa., will erect a new building to cost about $55,000.

The American Paper Mills Corporation, dealers in paper of New York City, has filed notice of an increase in capital stock from $100,000 to $125,000.

New Sand Filter

A SPECIAL filter for paper mills, producing all the results the paper manufacturer desires. It is a modification of the well known Hungerford filter adapted to paper mill use. It is constructed of concrete, strictly wrought iron pipe, brass strainers and especially prepared silica sand. It is as durable and efficient as can be built at any cost. It can be sold at a very low figure.

This filter gives perfectly clear water, washes thoroughly, does not require renewal of the sand bed, is absolutely reliable in the performance of its duty and requires a minimum amount of attention.

Send for full particulars

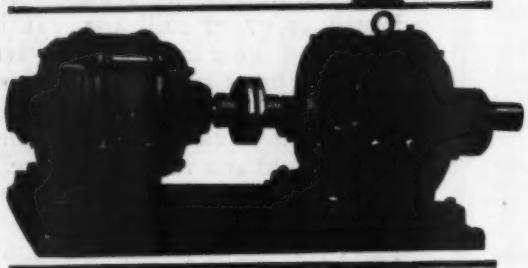
Hungerford & Terry, Inc.
CLAYTON, N. J.

Stickle Compound Condensing System
and Automatic Steam Control
for Paper Machines

As shown in the folder we sent out to the mills—"*How to Dry Paper*"—showing our Compound Condensing System for draining the dryers and heating the air with the discharge from the dryers to condition the machine room should interest you. We guarantee a saving of 20 per cent in steam consumed for this purpose.

Open Coil Heater & Purifier Company
Indianapolis Indiana
Boston Philadelphia

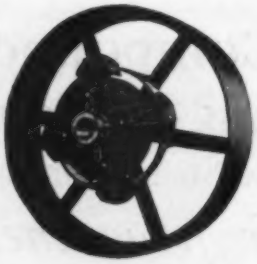
James Speed-Reducing Transmissions



James Transmissions eliminate complicated and open Gearing, Shafting, Belts and Pulleys, not to mention the great losses thru friction.
Send for Bulletin descriptive of our Speed Reducing Transmissions.
Manufacturers of cut Gears of every description.

D. O. James Mfg. Company
1114 W. Monroe St.,
Chicago, Ill.

Provide Operating Economy



FALLS SOLID FRICTION CLUTCH PULLEY

A complete line of

Power Transmission Machinery

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BELT AND ROPE DRIVES

MANUFACTURED BY

THE FALLS CLUTCH & MACHINERY COMPANY

NEW YORK
206-208 Fulton Street

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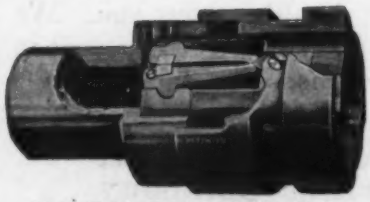
Catalogues upon request

THE JOHNSON FRICTION CLUTCH



Single Clutch Showing Working Parts

Is the Smallest and Most Compact Clutch

IT IS VERY POWERFUL FOR ITS SIZE

NOTE CONSTRUCTION—THE SLEEVE CARRIES A CURVE-SHAPED WEDGE WHICH SPREADS THE LEVERS WHEN SLEEVE IS MOVED FORWARD AND THE LEVERS BEING FULCRUMED IN THE RING, EXPANDS THE RING INSIDE THE CUP. THE FRICTIONAL CONTACT DRIVES THE CUP ON THE HUB OF WHICH CAN BE MOUNTED STANDARD STEEL SPLIT PULLEYS, CONE PULLEYS OR SOLID IRON PULLEYS FOR SHAFTING DRIVES. FOR SHORT CENTER DRIVES, SPROCKETS ARE USED.

WHEN INSTALLED ON MACHINERY GEARS ARE MORE OFTEN MOUNTED ON HUB.

WRITE FOR CATALOG "PI."

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

The Great Southern Roofing Co., Mobile, Ala., will build a mill to manufacture roofing felt and roofings.

It is reported that the Fraser Cos., Ltd., will build a new paper and pulp mill at Grand Falls, N. B.

The River Raisin Paper Co., Monroe, Mich., has plans under consideration for an addition to their plant.

The West Coast Pulp & Paper Co. are reported to be about ready to build a new mill at Olympia, Wash.

It is announced that a $75,000 addition will be built to the plant of the Magnolia Paper Co., Houston, Texas.

The American Bag & Paper Co., 2d and Vine Sts., Philadelphia, will build a seven-story plant 95x275 feet.

The Northern Engineering Works, Electric Crane and Hoist Builders of Detroit, Michigan, announce a change in address of their local sales offices as follows:
New York City, 30 Church street, Room 623, in charge of Mr. H. C. Rood; Philadelphia, 51 Estey Bldg., in charge of Mr. John H. Bricker; Chicago, 53 West Jackson Blvd., Room 630 Monadnock Bldg., in charge of Mr. M. H. Haeger, of the Abell-Howe Company; St. Louis, 606 Pontiac Bldg., in charge of Mr. J. S. Davidson.

The Hunter Pressed Steel Co., Lansdale, Pa., has perfected what they call "The Rotary Wick Feed Oil Cup." A feature of this new cup is the cap which is made onto the cup in a way that it will never come off. The cup is opened simply by turning the cap to the right or left. Like other Hunter Pressed Steel Products, this new cup is well made in every detail, and is certain to take a big part in keeping the wheels of commerce running smoothly.

The National Safety Council, with headquarters in Chicago, has issued the program for the joint meeting of the American Society of Safety Engineers and the Engineering Section of the National Safety Council which meeting will be held at 29 West 39th Street, New York City, on February 16. This program embraces a large variety of subjects all of which will be handled by capable speakers.

The Downingtown Manufacturing Company have secured the services of Mr. G. D. Kilberry as head of their designing staff on all Fourdrinier paper machines. Mr. Kilberry was in charge of the designing of the now famous Laurentide high speed news machines, as well as the first high speed news machines installed by the Great Northern Paper Company in 1915.

The United States Envelope Co., Div., Holyoke, Mass., building and lot has been bought by the Chemical Paper Mfg. Co. of that city. The new owners will use the building for general office and storage purposes for the present. The United States Envelope Co. is going to remove its machines to its Springfield divisions within the next six or eight weeks.

The Charles W. Knode Company, paper mill selling representative, has moved to new offices in Suite 220 at 52 Broadway, New York City. The company represents in the metropolitan territory the Chillicothe Paper Company, the Appleton Coated Paper Company, the Marr-McDonnell Company and Charles W. Wright & Son.

Nilsen, Lyon & Company, Inc., wood pulp importers, have moved from 140 Nassau street to 110 East Forty-second street, New York, where they are occupying more commodious and more centrally located offices.

Wilkinson Bros. & Company, one of the large and well-known paper jobbing houses of New York City, has increased their capital stock from $80,000 to $1,000,000.

The Wood Pulp Trading Company, wood pulp importers of 501 Fifth avenue, New York, has filed notice of an increase in capital stock from $25,000 to $100,000.

The Magnolia Paper Co., Houston, Texas, is working on plans for an addition to its present mill.

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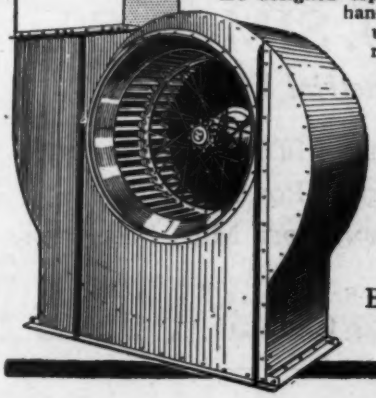
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Valuations

New York, February 1, 1923.

ACTIVITY in the paper industry is of fairly broad scope and there is a firm tone to the market. Consumers of paper of various kinds are absorbing supplies in very satisfactory volume for this period of the year. In fact, looking back over January, it can be stated without fear of contradiction that there was a greater demand for paper generally than probably ever before has been experienced during the first month of the year. Moreover, proof is not wanting that users of paper are purchasing today in an exceedingly healthy manner. Few are accumulating stocks of any consequence; practically all the buying engaged in is against immediate requirements, and the fact that the movement of paper from manufacturing plants is almost direct into consumption gives the situation a most pleasing and healthy complexion.

The outlook for a continuance of good demand for the various kinds of paper is regarded generally as bright. Manufacturers are imbued with the spirit of optimism, and there is a note of confidence sounded throughout the trade, with jobbers and dealers joining in the expression of expectations of splendid business all during 1923. Certainly the year has begun in a most auspicious manner, and the industry as a whole is favored with many encouraging factors which seem to promise much trade activity for the future. Consumption of many kinds of paper is not only up to what is considered normal but is exceeding normal tonnage; what is more, there are signs that as the year progresses and improvement in general business conditions continues consumption of paper will steadily increase. A large majority in the trade look for a new high record of news print consumption this year. Publishers are at present using up print paper at a rapid rate, advertising in the daily newspapers is increasing and circulation is mounting, and it appears almost certain that the news print consumption figures of 1920 which stand as a record, will be exceeded in 1923. As news print is the barometer of the industry, the trade therefore is bullishly inclined in its views regarding other kinds of paper also this year.

The last Federal Trade Commission report covering the month of December shows that production of paper in the United States declined somewhat during the final month of 1922. A total of 607,241 net tons of all kinds of paper and paper board was produced by domestic mills in December, compared with 641,544 net tons in November and 644,267 net tons in October of last year, the last named month constituting the record month of production for the year. The drop in output during December was to be expected in that holidays and the closing down of mills for repairs and inventory always reduces production in that month. The fact that December production was far in excess of any December output in the past is sufficient to show that the paper industry continued in a strong and active position during the closing month of 1922; for example, in December, 1921, production was but 508,284 net tons; in December, 1920, it was 445,539 tons; in December, 1919, it was 569,392 tons; in December, 1918, it was 435,779 tons, while an average of paper production based on reports covering the past five years was but 504,175 net tons, thus showing that December, 1922, output was some 103,000 tons in excess of normal in recent years.

Other available figures which show the strong statistical position of the industry are those relating to mill stocks of paper and board. At the end of 1923 total mill stocks mounted to 258,000 net tons of all kinds of paper and board, which represented but about 13 days' average output. That manufacturers are, moreover, producing almost entirely against actual commitments to consumers is shown by the fact that shipments from mills during December, 1922, were 587,342 net tons, or just 20,000 tons less than the total amount of paper and board produced in that month.

One of the outstanding features of the market in January was the strong position of box board. Demand for board in recent weeks has surprised nearly everyone in the trade. Not in the recollection of the present generation of manufacturers and dealers have buyers of board operated on such a broad scale and with such consistency at this period of the year as they have during the past month or six weeks. Paper box producers have been almost constantly in the market for board and they have absorbed supplies in large amounts. This in itself is one of the very best indications of big business that paper and board manufacturers could desire. Paper board is used principally for the making of boxes and containers, and it stands to reason that when there is a heavy demand for this product there is a large movement of all the numerous commodities and articles which are packed in paper boxes, thereby attesting to good business generally.

Board mills have been rushed to supply the demand for their product, and late reports are to the effect that most manufacturers are far behind in deliveries. Prices of board have steadily advanced and are at present very close to a hundred per cent above the bottom levels reached by the market during the slow period early last year. Plain chip board is selling at $70 and $75 a ton f.o.b. New York, and news board at about $80 a ton. Binder board is up to $90-$95 per ton, and other kinds of board are quoted at proportionately high prices. The prospects for board are excellent. Members of the trade contend that if demand is as lively as it is at this time of the year there is no telling how much board consumers will want in the spring when the pre-Easter season sets in.

News print quotations are firmly maintained, and there are many who predict higher prices later in the year though manufacturers are generally indisposed to go on record regarding the future of prices. Sentiment among print paper producers is rather in favor of the maintenance of prices at about prevailing levels so as to keep the market stable. It is not unusual at the moment for consumers to have to pay premiums for spot shipments of news print, however, as a large majority of mills are sold up for months ahead and as jobbers have but small stocks to dole out to transient buyers.

The book paper situation is steadily improving and prices rule firm and tending higher. Machine finished book is quoted at from 7 cents upward f.o.b. New York, and coated book at 10.50 cents upwards. The leading manufacturers of fine papers announced an advance of one to two cents per pound in prices during the final week of January, bonds, linens and ledgers selling at beyond 20 cents being advanced two cents a pound, and those grades quoted under 20 cents being increased one cent per pound. Wrapping and tissue papers are moving in good volume and at steady quotations.

Recent Publications

The American Spiral Pipe Works, Chicago, are distributing a very beautiful seventy-five page book which brings out important features and special uses for well made spiral pipe. This book is artistically illustrated with actual photographic reproductions showing many installations, under a variety of circumstances where spiral pipe has made good.

A well gotten up catalog has recently been published by the Hardinge Company, New York, dealing with the subject of conical mills and their application to the field of grinding and pulverizing. This catalog treats the matter of pulverizing and grinding both wet and dry in a manner that will interest all paper mill men.

Small single-stage centrifugal pumps for motor or belt drive are described in a leaflet and an instruction manual issued by the De Laval Steam Turbine Company of Trenton, N. J. These publications give complete tables and instructions for selecting pumps for different conditions in the mill.

The first general catalogue listing all products made by the Combustion Engineering Corporation of New York is now off the press and makes a very neat presentation as well as one of great interest to the engineer.

Chandler & Taylor Company of Indianapolis have recently issued bulletin 135 on steam engines for direct connection to electric generators. An up-to-date description of this type of engines is the important feature of this bulletin.

An address entitled "Some Problems of the Day" made by Charles Piez, president of the Link-Belt Company, at the annual banquet of the Engineers' Society of Western Pennsylvania is now available in booklet form.

Copies of a recent booklet entitled "Our World Trade" may be secured from the Foreign Commerce Department, Chamber of Commerce of the United States, Washington, D. C.

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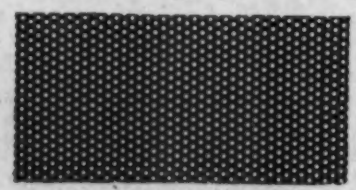

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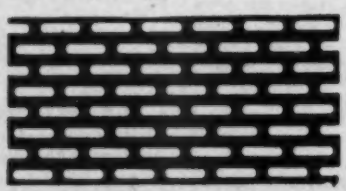

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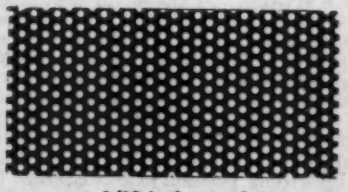

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Domestic Raw Materials

Papermaking Rags

Increasing strength and activity in low grades continues to be the feature of the papermaking rag market. Demand for rags from felt paper mills has been brisk and prices have advanced to a level where they are as high as, if not higher than, at any time for a year or longer. The better qualities of rags also have been in good demand. Paper manufacturers have purchased in much larger volume than is ordinarily the case in January, and it can be stated that the market during the past month has exhibited far more life than has been noted in the first month of the year in a long time.

The situation which has developed in those grades of rags used by roofing paper mills is due to a combination of factors appertaining to supply and demand. As a general thing, felt manufacturers keep mostly out of the rag market during the holiday period and for a month or so afterward, but they suddenly started buying rags in sizeable quantities about the middle of December and have continued to buy in large tonnage since, apparently because they have been in need of supplies. There is no doubt that activity in the felt paper trade has been greater during the past month than is usually witnessed at this period of the year; moreover, the outlook for big business in building papers of all kinds throughout 1923 is exceedingly favorable, which probably explains why felt producers suddenly entered the rag market toward the close of last year and why they have continued to absorb rags freely since then. The building program of the country for this year is of even broader scope than in 1922—and it cannot be denied that last year witnessed extensive building operations all over the United States—and reports say that felt paper mills already are experiencing a splendid demand for their product and that they are running at a larger rate of capacity than usually at this time. This accounts for the growing demand for low grades of rags, and explains in large measure the very bullish feeling prevailing among rag dealers and importers regarding the future.

Viewing the rag situation from the supply angle, and remembering, of course, that prospects are for a heavy consumption of rag stock by paper mills during 1923, it must be stated that conditions are none too favorable for the paper manufacturer. Supplies of papermaking rags in this country and in Europe are at present much smaller than at the same time a year ago. The obvious reasons for this are that consumption in the past six or eight months has been exceptionally large, while collections have not been up to normal. People the world over are living in a more conservative way today than they were during and immediately following the war. Financial and industrial conditions, especially in European countries, are such as to compel them to, and it naturally follows that clothing is being worn longer and that fewer garments are discarded. This reduces the supply of rags at primary sources; another factor is that, from all indications, there are fewer men in the rag trade at present than normally so that there is proportionately lighter collection.

One thing seems certain in connection with the rag situation, and that is if consumption of rags by American paper mills in 1923 continues throughout the year at the same rate of the past six to eight months, there is small likelihood of rag prices falling below prevailing levels. This is particularly obvious as applying to roofing rags, and the salient reason is that consumers in this country cannot expect to secure as large supplies of roofing stock from European sources this year as they did last. It is generally recognized that the United States must get a large part of its requirements of roofing rags from abroad when felt mills in this country are operating at anywhere near capacity, and there is no secret to the fact that for the past half year or longer probably more than 50 per cent of the roofing stock consumed by American mills has been foreign material. Late reports from various European sources state that stocks of rags there have been greatly reduced; this seems proved by the very strong attitude of dealers on the other side of the Atlantic in recent weeks when inquiries for rags have been going forward in large number from this side and when offerings by European shippers have been of noticeably small volume.

However, there does not appear to be any probability of a serious shortage of papermaking rags arising. Old rags are a peculiar commodity which at times, when consumers do not want them, are not worth the expense of collection, and which at other times when demand for them is active, are worth almost their weight in gold, and it is a well-known axiom of the rag industry that attractive prices bring out large supplies. It is more than likely that paper manufacturers of the United States will secure all the rag stock they will require this year, but on the other hand it is just as likely that they will have to grant sufficiently high prices for this raw material to induce collectors, dealers and importers to provide the supplies wanted. Conditions—labor and otherwise—are such at present as to warrant comparatively high prices on rag stock.

Roofing rags have sold in the East at 1.45 cents a pound f. o. b. shipping points for No. 1 packing, and 1.35 cents for No. 2 stock, while even higher prices than these obtain in the West, where larger tonnage usually figures in transactions and where dealers are reported demanding around 1.60 cents for No. 1 roofing stock and 1.50 cents for No. 2 packing. Foreign dark cottons are bringing an average of about 1.40 cents per pound ex dock New York in sales to felt mills, and importers assert that they are having difficulty in purchasing additional lots in Europe to be sold at this price basis to mills here owing to European shippers holding out for higher figures.

There is a good movement of practically all grades of new cuttings. Prices on these rags also are firm and on the rise, with dealers complaining of the stiff prices clothing manufacturers demand, this being largely an outcome of the high level of raw cotton and cotton piece goods and the consequent belief among clothing producers that their clippings should be worth proportionately as much more. New white shirt cuttings of No. 1 quality are quoted at about 12.50 cents a pound at dealers' shipping points, washables at 4.75 cents, blue overall cuttings at 7 cents, light silesias at 8 cents, and light flannelettes at 9.50 cents.

Old white rags are firming though no important revisions of quotations have occurred. The firm position of roofing stock has a strengthening influence on thirds and blues, and packers generally ask 2.25 cents a pound for repacked blues and 1.75 cents for rough packing. Imported linens are in fair demand and are quoted at steady prices.

Average quotations f. o. b. shipping points and ex dock are:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	12.50-13.00
White shirt cuttings, No. 2	6.50- 7.00
Fancy shirt cuttings	6.50- 6.75
Washables, No. 1	4.75- 5.00
Unbleached muslins	10.50-10.75
White lawns	10.25-10.50
Overall cuttings, blue	7.00- 7.25
Black silesias	5.50- 5.75
Light flannelettes	9.50- 9.75
Canton flannels, bleached	9.75-10.00
Canton flannels, unbleached	8.75- 9.00
Shoe cuttings, bleached	9.25- 9.50
Shoe cuttings, unbleached	7.75- 8.00
Light silesias	7.75- 8.00
Linens, No. 1 white, foreign	14.00-15.00
Light prints, foreign	5.00- 5.25
Old Stock—	
Whites, No. 1, repacked	6.00- 6.50
Whites, No. 2, repacked	3.75- 4.25
Whites, house soiled	2.10- 2.25
Whites, street soiled	1.90- 2.00
Lace curtains	3.75- 4.00
Thirds and blues, rough	1.70- 1.80
Thirds and blues, repacked	2.10- 2.25
Black stockings	3.25- 3.50
Cotton canvas, No. 1	3.75- 4.00
White cotton batting	5.00- 5.25
Roofing, No. 1	1.45- 1.60
Roofing, No. 2	1.25- 1.50
Dark colored cottons, foreign	1.35- 1.45

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Works: Kearny, New Jersey

Blue linens, foreign	3.50- 4.00
Grey linens, foreign	5.50- 6.00
White linens, foreign	10.50-11.00
Light prints, foreign	2.25- 2.50

Rope and Bagging

Prices of old manila rope have strengthened under a consistently good call for supplies from paper mills, and the tendency of the market continues in an upward direction. Domestic manila rope in No. 1 condition is bringing 6.25 cents a pound at shipping points, and in at least some instances buyers have paid beyond this figure, while foreign manila rope is selling at about 6 cents a pound ex dock New York and other American Atlantic ports with now and then a sale reported at an eighth of a cent higher. Bag paper mills are reported busy and are said to be absorbing old rope freely, and while available supplies seem ample to cover the requirements of consumers, at the same time there are no indications of any large accumulations of old rope in any quarter.

Old bagging is a comparatively dull item. Consumers are buying in spasmodic fashion as their needs develop, but the aggregate movement appears below a normal volume. Prices are rather steady. Roofing bagging is selling at 90 to 95 cents a hundred pounds at dealers' shipping points, and No. 1 scrap bagging is quoted at $1 to $1.15 per hundred pounds. Gunny bagging is in moderate demand and dealers as a rule ask 1.25 cents a pound or more for No. 1 packing.

F. o. b. shipping point quotations follow:

	New York and Chicago
Gunny, No. 1 domestic	1.25- 1.35
Gunny, No. 1 foreign	1.20- 1.30
Scrap bagging, No. 1	1.00- 1.15
Roofing bagging	.90- .95
Wool tares, heavy	1.40- 1.60
Wool tares, light	1.30- 1.50
Manila rope, No. 1 foreign	6.00- 6.25
Manila rope, No. 1 domestic	6.25- 6.50
Sisal strings	1.25- 1.50
Mixed strings	.85- .95

Old Paper

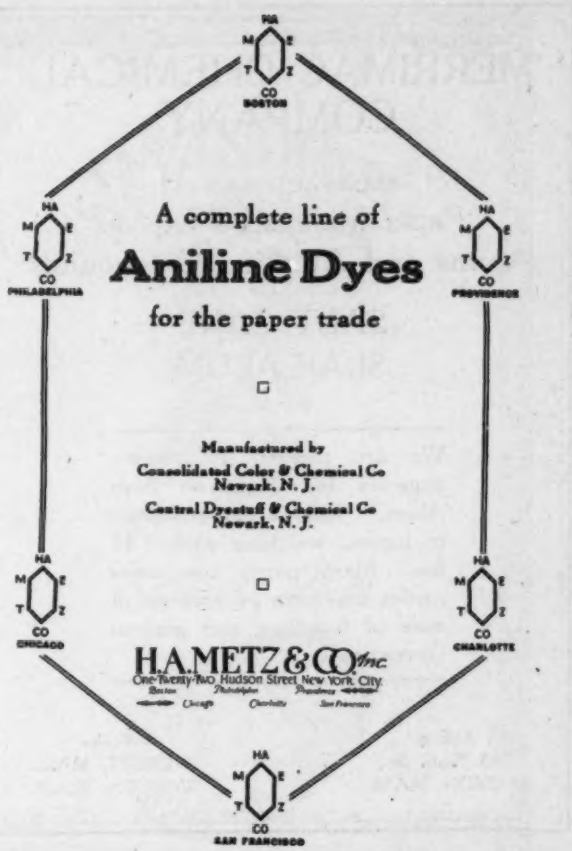
A very lively market has existed for old paper; in fact, the situation in the past several weeks has smacked of a boom in this class of papermaking raw material. Activity in the box board trade has occasioned large operations by board mills and resulted in a big consumption of waste paper, which has kept board makers in the market as buyers of old paper very nearly all the time, and those on the selling side of the trade have taken full advantage of ruling conditions to boost prices to levels which stand as a record since the memorable spurt of the waste paper market following the world war.

Low grades in particular have been strong in price and in brisk demand. Such descriptions as old folded newspapers and mixed paper have jumped in value to a point where prevailing prices represent a rise of more than a hundred per cent from the levels current not so long ago. Flat folded newspapers are fetching 1.60 cents a pound at shipping points in sales to board mills, and No. 1 mixed paper 1.30 cents and higher, and present indications are that even these market levels will be exceeded if the demand from consuming quarters keeps up at the present rate.

Book stock continues in active demand and prices on these grades have scored further advancement. In fact, it is pointed out that old magazines are bringing relatively higher prices than unbleached sulphite pulp, despite which book paper mills are purchasing book stock freely and meeting the figures asked by dealers. Heavy No. 1 books and magazines are quoted at a minimum of 2.60 cents at shipping points, and crumpled book stock is bringing 2.20 to 2.30 cents. Shavings are firm at between 4.25 and 4.50 cents per pound for No. 1 hard white, and from 3.65 cents upward for No. 1 soft white shavings at dealers' points. Old kraft paper has risen in price to 2.35 cents, and ledger stock is selling at 2.85 cents a pound and more.

F. o. b. shipping point quotations are:

	New York and Chicago
Hard white shavings, No. 1	4.25-4.50
Hard white shavings, Nos. 2-3	3.50-4.00
Soft white shavings	3.65-3.85
Colored shavings	1.75-2.00
Heavy book, No. 1	2.60-2.75
Crumpled book, No. 1	2.20-2.30
Ledger stock	2.85-2.95
Kraft, No. 1	2.35-2.50
Manilas, No. 1	1.75-1.90
White blank news	2.40-2.50



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MANUFACTURERS OF

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Alums and Alumina Compounds

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SLAB ALUM

We are pleased to receive inquiries for Merrimac Slab Alum. This is manufactured in ingots, weighing about 42 lbs. Many paper companies prefer this form on account of ease of handling and general convenience.

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Caustic Soda 76%
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PITTSBURGH PENNSYLVANIA

Over-issue news, No. 1	1.70-1.80
Folded news	1.55-1.65
Mill wrappers	1.50-1.60
Box board cuttings	1.30-1.40
Mixed paper, No. 1	1.25-1.35
Common paper	.95-1.00

Chemical Pulp

After showing a rather easy undertone during the holiday period and immediately following, the market for chemical wood pulp has firmed to a noticeable degree. Prices show little change from those last reported, but there is a stronger tone and the tendency of quotations is now, if anything, in an upward direction, this being due partly to improvement in demand from consuming quarters and partly to the strengthening influence of the situation that has recently developed in the Swedish pulp industry. Domestic producers contend that if the lockout in pulp industry in Sweden lasts for any appreciable length of time the obvious result will be that the Swedes will not have their usual accumulation of pulp to ship to the United States when the Baltic reopens and that manufacturers in this country and Canada will thereupon be called on to supply paper mills with larger amounts of sulphite and kraft pulps. The probability of this developing, together with an expansion of demand for most grades of pulp in recent weeks, have been creative of a much firmer attitude among sellers of pulp.

It is stated on good authority that pulp mills of the United States are operating only at approximately 80 per cent of capacity. There is, however, a ready demand for practically all the output of mills at present, and in at least most cases the trend is toward larger production. It must be remembered, on the other hand, that importations of wood pulp into the United States in 1922 broke all records, and the consuming market in this country is of course still is in the process of absorbing this tremendous supply of pulp brought in from outside sources, thereby diminishing demand for the domestic product.

Manufacturers continue to quote 5 cents a pound for No. 1 bleached sulphite but most of them are accepting orders at prices a little below this, down to 4.25 cents having been mentioned at which sales have been made though the pulp involved in such transactions was not of No. 1 quality. Unbleached sulphite holds at 2.75 to 3 cents a pound for the No. 1 grade, with news sulphite quoted at 2.60 to 2.75 cents. Soda pulp is steady at 4.25 cents a pound at producing mills, and kraft is quoted at 3 to 3.25 cents for the No. 1 grade.

F. o. b. pulp mill quotations follow:

Bleached sulphite	4.50-5.00
Easy bleaching sulphite	3.00-3.25
Unbleached sulphite, No. 1	2.75-3.00
News grade sulphite	2.60-2.75
Soda pulp, bleached	4.00-4.25
Mitscherlich, unbleached	3.25-3.50
Kraft, No. 1	3.00-3.25
Screenings, refined	1.00-1.15

Mechanical Pulp

A very firm market exists for mechanical wood pulp. Demand is brisk and prices have shown a steady advance until they are now on levels which are higher than have prevailed in over a year. Domestic spruce ground wood is selling at around $46 per ton at grinding plants for freshly ground pulp for prompt shipment, and some sales are said to have been made at several dollars a ton above this figure. Foreign ground wood, of which some sizeable shipments have recently been received, is reported bringing about $47 or $48 a ton ex dock at New York or other American Atlantic ports.

The strong position of mechanical pulp is nothing more than a reflection of the inexorable law of supply and demand. Consumption has been running high for the past six or eight months, while production has not been anywhere near the amount of pulp used. This is proved by Federal Trade Commission figures which show that mill stocks of ground wood on August 31, 1922, totaled 157,515 net tons, whereas three months later at the end of November stocks had been reduced to 80,212 net tons. Unfavorable water conditions have been the principal reason of the low output, and the supply situation has reached a point where a majority of producers are offering but scant amounts of pulp in the open market while conserving stocks for their own use. Moreover, there is an active call for ground wood from news print and box board manufacturers, which has a strengthening effect on prices.

Chemicals

A good movement of practically all kinds of chemicals used by paper and pulp manufacturers is reported, and prices rule

Soda Ash

Caustic Soda

Distinguished for Their High Test and Uniform Quality

Manufactured by
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Hinde & Dauch Paper Co.

Corrugated
Fibre Shipping Boxes
and Packing Materials of
Acknowledged Superiority

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What Are Your Paper Tests Worth?

It is generally conceded that tearing tests, made with the hands, are frequently inaccurate. They MUST be—because of the human equation. What such tests are worth is questionable.

On the other hand, tests made with the Elmendorf Paper Tester are accurate—ALWAYS. A reason why the Elmendorf is used by the American Writing Paper Co., Continental Bag and Paper Co., Robert Gair Company, Kalamazoo Vegetable Parchment Co., and hundreds of others.

The Elmendorf Paper Tester works by gravity without springs.—Measures the strength of paper WITH and ACROSS the grain.

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ELMENDORF Paper Tester

104B

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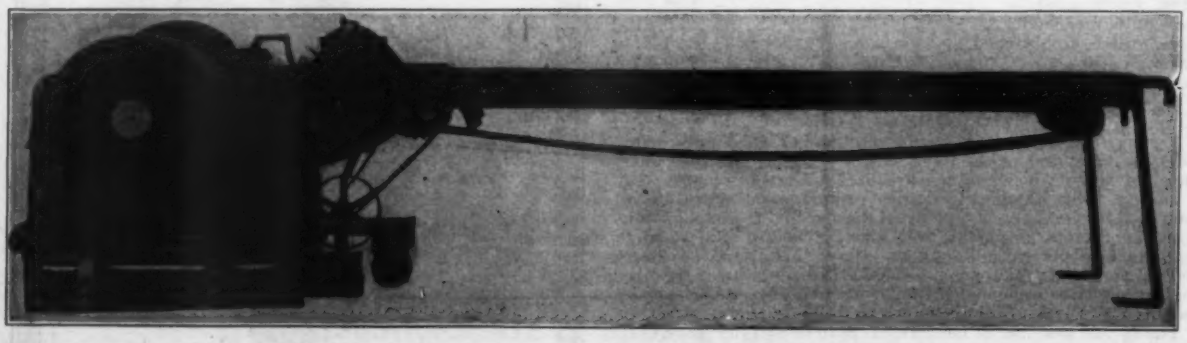

Capacity 2½ Tons Per Hour
Especially Adapted for Handling Waste Paper, Magazines, Etc., Before Feeding to the Beaters

Whatever You Cut, A GIANT Will Sólve Your Problem

LET US FIGURE IT OUT FOR YOU

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Canadian Representatives

R. J. MARX
133 Finsbury Pavement, London E. C.
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New Papers

Writing—	
White rag	20-45
White sulphite	12-25
Colored rag	16-40
Ledger—	
White rag	20-50
White sulphite	14-25
Colored sulphite	12-20
Colored rag	16-50
Bonds—	
White rag	19-45
White sulphite	10-25
Colored sulphite	11-25
Colored rag	18-45
Book—	
No. 1 S. & S. C.	7.00- 7.50
Machine finished	6.75- 7.50
English finished	7.00- 7.75
Coated and enameled	10-50-13.00
Lithograph, M. F.	10.00-12.00
News Print—	
Rolls, contract	3.75-4.00
Rolls, transient	4.00-4.25
Sheets	4.25-4.50
Side runs	3.25-3.50
Cover stock—	
Coated, both sides	10.25-
Coated, one side	10.15-
Tissue—	
No. 1 white, 20x30	.85- .95
No. 2 white, 24x36	.75- .80
No. 1 manila, 24x36	.75- .80
Kraft	1.00-1.25
Wrappings—	
No. 1 Kraft	7.00-7.50
No. 2 Kraft	6.25-6.50

Boards—	New York and Chicago
Solid news	80.00-85.00
Straw	60.00-65.00
Plain chip	70.00-75.00
White coated chip	90.00-95.00
Manila coated chip	80.00-85.00
Binders' board	90.00-95.00

CHEMICALS—(Continued)

firm with very few exceptions. Casein is the feature of the market. Despite receipts of some large shipments of this product from the Argentine recently, the market is almost bare of available supplies of casein for prompt delivery, and book paper converters are said to be offering very close to any price to get needed supplies. Twenty cents per pound and higher are reported to have been paid. Bleaching powder is steady at about 1.75 cents a pound in domestic drums, and caustic soda continues to sell at 2.50 to 2.75 cents for spot shipment.

Average quotations are as follows:

Alum, lump ammonia	3.25- 3.50
Alum, lump starch	3.75- 4.00
Blanc fixe, powdered	4.00- 4.25
Bleaching powder	1.75- 2.00
Brimstone (long ton, at mine)	18.00-20.00
Casein	20.00- ...
Caustic soda, spot delivery	2.50- 2.75
China clay, domestic washed	12.00-15.00
China clay, foreign	15.00-22.00
Rosin, grade E	7.00- ...
Satin white	1.50- 1.75
Soda ash, 58 per cent light (bags)	1.20- 1.30
Starch, papermakers', in bags	2.82- ...
Talc (ton)	14.00-17.00

Plans for Exposition Developing Rapidly

So many paper companies have offered the use of films portraying the processes of paper manufacturing that it is now assured that a daily motion picture exhibition will be one of the features of the Paper Industries Exposition, to be held at the Grand Central Palace, New York, the week of April 9.

It is expected that several additional films will be available telling the story of paper and the manufacture of different grades and types of the product of this industry. In addition, several related films are being secured, and a detailed program of the motion picture side of the big paper show will be completed at an early date.

Among the companies whose films are certain to be shown are those of the International Paper Company, and the Mead Company of Dayton, Ohio, on news print; the Scott Tissue Company on "Thirsty Fibre," and the fine paper film of the Strathmore Paper Company. Another fine paper film made for the Writing Paper Manufacturers' Association will be available, also, and a different type of film, showing the activities of paper mills in campaigning for safety will be the picture of the Safety Picnic of the employes of the Nekoosa-Edwards Paper Company.

Meanwhile, the commercial exhibit space is being taken up in a surprising manner. Not only is the number of exhibits being contracted for exceeding the expectations of the management, but the variety is a notable feature of the contracts already placed. Among the widely different lines for which space has already been assigned are the manufacture of chlorine gas and control instruments, coagulants and causticizing apparatus; ball bearings and pumps of all kinds; stokers and furnace equipments, bronze and brass castings, tubes, etc.; silica iron apparatus, acid condensers, rolls and beaters, paper felts, in fact, the entire line of paper making supplies.

There is also already a wide variety of exhibits of different kinds of paper assigned space. Wall board, corrugated paper and boxes, vegetable parchment, fine papers and wrapping papers are all represented among the exhibits to be installed by manufacturers.

An interesting phase of the call for exhibit space is the manner in which associations are planning exhibits. The Association of Felt Manufacturers and another Manufacturers' Association are planning exhibits to fit into the special selling campaigns of these groups. The wall paper manufacturers are spending in the neighborhood of $750,000 a year in advertising the use of wall paper, by illustrating means of home beautification, and are planning an elaborate exhibit at the paper week exposition.

An interesting side of the plans for the Exposition is the formulation of an advertising campaign to bring printers and the big consumers of paper to see the exhibits. Several big national magazines are to carry advertising pointing out to printers the education they can secure on the basic question of paper, by visiting the Exposition.

The Exposition is being recognized three months before the date for the opening of its doors, as offering an unparalleled opportunity for all branches of the pulp and paper industry to display vividly and clearly to American capital and enterprise, as well as to the general public, the great advances in machinery methods and processes which have contributed to the colossal development of the industry in the last decade, to such an extent that the per capita consumption of paper in 1920 rose to the total of 138 pounds, while the nearest approach to this figure was Canada with less than 100 pounds per capita for that single year.

One of the big manufacturers of paper mill machinery has contracted for three booths, to house the exhibit which he plans to bring from his plant in the Middle West. Several others are taking two spaces, instead of confining their exhibits to a single booth. The fact that the Exposition is to be held during the week of the annual conventions of the American Paper and Pulp, National Paper Trade and allied associations is adding to the importance which the Exposition is being accorded in the eyes of the paper industry.

"MICHIGAN" Combination Steel and Wood Pipe

LONG DISTANCE CONVEYOR OF WATER AND PAPER STOCK IN PAPER AND PULP MILLS—Specially Adapted to Carry Sulphite, Ground Wood and "White Water"

Eighteen reasons why you should use "Michigan" combination steel and wood pipe

1—Durability of Wood Shell. 2—Sanitary. 3—20% more capacity than Cast Iron Pipe. 4—Simplicity in handling. 5—Light in weight. 6—Speed in laying. 7—Protects against freezing. 8—Not affected by Electrolysis. 9—Rigid inspection of materials. 10—Efficient construction of stave. 11—Strength of steel banding. 12—Protection of banding with asphalt coating. 13—Cannot burst under pressure. 14—Can be laid in a wet trench. 15—Short curves without specials. 16—Low installation and maintenance cost. 17—Responsibility of company. 18—Not affected by sulphur or chemical solutions.

THE MICHIGAN PIPE COMPANY

Dept. 17 BAY CITY, MICHIGAN

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Oklahoma City, Okla.....105 West 16th St.
Chicago, Ill.....Leiter Bldg., 15 East Van Buren St.
Boston, Mass.....Room 737, Oliver Bldg.
Cleveland, Ohio.....919 Ulmer Bldg.
Chattanooga, Tenn.....702 James Bldg.
Philadelphia, Pa.....318 Widener Bldg.
Pittsburgh, Pa.....323 Fulton Bldg.

"Steel for Strength—Wood for Durability"

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SUNDS AKTIEBOLAG
STRONG SULPHITE
indirect cooking

PERKINS-GOODWIN CO.
NEW YORK
PULP and PAPER

Agents
A/S Toten Cellulosefabrik
BLEACHED AND
EASY BLEACHING
SULPHITE

Wood Pulp

One of the most important developments in the wood pulp situation in a long time is the declaration of a lockout of mill operatives by Swedish manufacturers. The lockout became effective on January 29, and was in retaliation of a strike instituted by the workers at the first of this year when the labor agreement expired and when demands were made for a 20 per cent increase in pay. On the other hand, the pulp producers of Sweden argued for a 20 per cent reduction in wages, and after several meetings of representatives of the two sides at which arbitration failed, the mill owners declared a lockout.

Pulp trade factors in the United States express the opinion that this sudden halting of production in Sweden cannot but have material influence on the market here in due time. Thus far the effect has been largely sentimental, nevertheless there has been a distinct firming of the price tone of foreign pulps and importers seem less desirous of disposing of their stocks as they were a short time ago. It is gathered from the late advices received from Sweden, that pulp manufacturers were mostly in favor of a lockout as a means of settling the present labor dispute, both because they regarded such action as the surest way of bringing their workers to terms, and also because the strike in the forests of Sweden recently have so reduced the cut of pulp wood that most manufacturers in the Scandinavian country are short of timber for pulp making and therefore are more inclined to shut down their mills at this time so as to conserve their wood supplies rather than have to stop producing in the spring when navigation is open and when demand for pulp usually is better than during the winter. For these reasons, it is expected that the lockout will be maintained for quite some time, which will mean that it is very unlikely American paper manufacturers will find the usual accumulations of pulp in Sweden when navigation over the Baltic is resumed in the spring, and which may lead to a very firm pulp market on this side of the Atlantic at that time.

Importers report that manufacturers in Scandinavia are entertaining very high price ideas regarding pulp. Quotations on unbleached sulphite for shipment from Sweden when navigation opens are said to range well over 3 cents per pound, and kraft pulp is quoted at from 3 cents upward a pound c.i.f. American ports. Even at such prices it is stated shippers in Sweden do not appear particularly anxious about booking tonnage orders.

Despite the firming position of pulp abroad. the domestic market for imported pulp is none to strong. The reason for this is that large amounts of pulp have arrived in recent weeks, imports having been so heavy as to create congestion at the chief ports where foreign pulp is received and to cause importers in frequent cases to grant price concessions to dispose of stocks. No broad changes have occurred in quotations but instances are often cited where pulp has been obtained by paper mills at considerably under the prices asked, showing that the market tone is somewhat easy and that there are weak holders of pulp at present.

Bleached sulphite is quoted at around 4.50 cents per pound ex dock for the No. 1 grade. with down to 4.25 cents and as high as 5 cents quoted in different quarters, depending on the quality of the pulp and the quantity involved. Unbleached sulphite is quoted at 2.75 to 3 cents per pound on the dock, and easy bleaching sulphite at 3 to 3.25 cents. Kraft pulp has firmed slightly to where importers of Swedish kraft are asking around 2.90 cents a pound ex dock or higher, and ground wood is stronger in price at $46 to $48 per ton ex dock.

Receipts at the port of New York in January and current market quotations ex dock New York follow:

Bleached sulphite, No. 1	$ 4.25-$ 4.75
Unbleached sulphite, No. 1	2.75- 3.00
Easy bleaching	3.00- 3.25
Mitscherlich unbleached	3.00- 3.25
Kraft	2.85- 3.00
Ground wood, per ton	46.00- 48.00

Castle & Overton, 1.520 bls. from Hamburg and 1,476 bls. from Rotterdam; E. Naumberg & Co.. 9,928 bls. from Hamburg and 4,000 bls. from Sebenico; Nilsen, Lyon & Co., 250 bls. from Hamburg; Johaneson, Wales & Sparre, 504 bls. from Gothenburg, 1,000 bls. from Hamburg and 3,072 bls. from Copenhagen; E. M. Sergeant & Co., 1,131 bls. from Gothenburg and 650 bls. from Drammen; Kidder Peabody Acceptance Corp., 400 bls. from Drammen and 10,000 bls. from Kragero; M. Gottesman & Co., 500 bls. from Drammen and 510 bls. from Rotterdam; J. Andersen & Co., 3,330 bls. from Drammen; Scandinavian-American Trading Co., 3,180 bls. from Harnosand; E. J. Keller Co., 4,268 bls. from Harnosand; A. J. Pagel & Co., 1,200 bls. from Hornefors, 5,400 bls. from Husum, 11,368 bls. from Dornsjo and 11,250 bls. from Gefle; National Bank of Commerce, 1,270 bls. from Bremen; National City Bank, 12,750 bls. from Drammen, 3,200 bls. from Hamburg and 2,720 bls. from Bremen; Mechanics & Metals National Bank, 1,875 bls. from Hamburg; Irving National Bank, 1,829 bls. from Harnosand; Bulkley, Dunton & Co., 4,000 bls. from Stugsund and 6,000 bls. from Gefle; American Woodpulp Corp., 1,200 bls. from Hamburg; Woodpulp Trading Co., 5,000 bls. from Skien and 121 bls. from Kragero; Order, 4,219 bls. from Bremen, 7,408 bls. from Hamburg and 10,546 bls. from Namsos; Tidewater Paper Mills Co., 34,032 bls. ground wood from Liverpool, N. S.

Paper Stock

Increasing demand for practically all kinds of waste material used for papermaking is beginning to be reflected in larger imports into the United States. January receipts of cotton rags, old rope and other paper stock were fairly heavy, at any rate they showed a gain over the arrivals of the several previous months, and the probabilities are importations will continue rather large over the next couple of months since it is reported that some big orders have recently been placed by paper manufacturers. Importers describe market conditions abroad as strong. Papermaking rags, for example, are said to be available in but limited tonnage and that high prices are demanded by European shippers. One of the features of the trade during the past month has been the importation of waste paper, principally from England, which reflects the high prices prevailing in this commodity in the United States. Old paper is imported only when the market here is high, but prices have been on sufficiently high levels recently to permit importers to bring in supplies and realize good profits.

Arrivals at the port of New York in January follow:

Old Rope

Waste Material Trading Corp., 37 bls. from Rotterdam; N. E. Berzen, 5 bls. from Havana; E. J. Keller Co., 54 coils from Leith and 302 coils from Newcastle; W. Schall & Co., 147 bls. from Barcelona; Bemis Bro. Bag Co., 60 bls. from Barcelona; Brown Bros. & Co., 70 coils and 152 bls. from Rotterdam, 271 coils from Bristol, 452 coils from Hull, 76 bls. and 90 coils from Antwerp and 69 bls. from Glasgow; L. H. Abenheimer, 64 bls. from Rotterdam; Katzenstein & Keene, 130 bls. from Genoa; International Purchasing Co., 9 bls. from Havana and 102 bls. from Algiers; Maurice O'Meara Co., 41 coils from Antwerp; V. Gallaud, 42 bls. from Havre; Irving National Bank, 50 coils from Havre and 10 coils from Hamburg; Equitable Trust Co., 123 coils from Glasgow; New York Trust Co., 49 coils from Hamburg; United States S. S. Lines, 114 coils from Bremen; J. Barry, 152 coils from Bristol; Ellerman-Wilson S. S. Line, 68 coils from London and 15 coils from Southampton; London and Liverpool Bank of Commerce. 64 coils from London; Mechanics & Metals National Bank, 33 coils from Hamburg; Order, 188 coils from Rotterdam, 30 coils from London, 3 bls. from Santiago, 42 bls. from Leghorn and 366 bls. from Genoa.

Old Bagging

E. J. Keller Co., 188 bls. from Antwerp and 235 bls. from Havre; Waste Material Trading Corp., 35 bls. from Rotterdam; Mechanics & Metals National Bank, 28 bls. from Hull. 69 bls. from Leith and 102 bls. from Havre; Giegle Trans, 105 bls. from Havre; Irving National Bank. 256 bls. from Antwerp; American Exchange National Bank, 204 bls. from Havre; E. Butterworth & Co., 121 bls. from Rotterdam; Castle & Overton, 144 bls. from Rotterdam; Katzenstein &

The Pulp and Paper Trading Co.
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AGENTS FOR
J. & J. Rogers Company, Ausable Forks, N. Y.
E. B. Eddy Company, Ltd., Hull, Canada

Canadian Kraft Limited, Three Rivers, Canada
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EASTERN AGENTS of Sulphite Pulp. Made by
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BLEACHED AND UNBLEACHED

Agents for Kellner Partington Paper Pulp Co., Ltd.
Sarpsborg, Norway; Forshaga, and Edsvalla, Sweden

Quality: It means more than price

The B Co INC

"Hafslund Bear"
"Forshaga"
Bleached Sulphite
"Klarafors"
Easy Bleaching Sulphite
Strong Unbleached Sulphite

PULP

"Hurum"
"Bamble"
Extra Strong Kraft; Bleached and Bleachable Sulphate
"Edsvalla" 50% Moist
"Dejefors" Dry
White Spruce
Ground Wood

Tonnages available on dock for prompt shipment

THE BORREGAARD CO., INC.
200 FIFTH AVENUE NEW YORK CITY

BATHURST LUMBER COMPANY, LIMITED

PRICE & PIERCE, LTD.
17 East 42nd Street, NEW YORK CITY

ARE NOW THE

SOLE SELLING AGENTS
for Bathurst Pulp

Unbleached Sulphite 50 tons daily
Kraft Pulp 50 tons daily

Our pulp is made from Canadian Spruce
We ship in sheets, baled

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INCORPORATED
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NEW YORK

FOREIGN AND DOMESTIC
PAPER MAKERS' SUPPLIES
CHEMICAL AND MECHANICAL PULPS
COTTON, JUTE AND FLAX WASTES
EAST INDIA MERCHANDISE

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MANUFACTURERS OF
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ANIMAL SIZING GLUE STOCK

LARGEST SPECIALISTS IN AMERICA ON
FINE WRITING PAPER SIZING

E. F. RUSS COMPANY 261 Devonshire S. BOSTON, U. S. A

Keene, 133 bls. from Manchester, 138 bls. from Rotterdam and 185 bls. from London; Order, 216 bls. from Antwerp and 74 bls. from Barcelona.

Rags

Katzenstein & Keene, 274 bls. from Rotterdam and 723 bls. from Havre; E. J. Keller Co., 685 bls. from Havre. 403 bls. from Antwerp and 10 bls. from Kobe; Maurice O'Meara Co., 75 bls. from Rotterdam, 37 bls. from Hamburg and 195 bls. from Hull; S. Silberman Co., 1,155 bls. from Rotterdam; Castle & Overton, 155 bls. from Rotterdam; Lavin & Rosenberg, 163 bls. from London; Albion Trading Co., 78 bls. from Manchester; F. P. Gaskell & Co., 13 bls. from Bremen and 120 bls. from Hamburg; H. Muehlstein & Co., 939 bls. from Liverpool; Stone Bros. & Galaup Co., 727 bls. from Havre; American Woodpulp Corp., 867 bls. from Antwerp and 51 bls. from Havre; Salomon Bros. & Co., 88 bls. from Antwerp; W. Schall & Co., 283 bls. from Havre; Goldman, Sachs & Co., 19 bls. from Hamburg; Ladenburg, Thalman & Co., 24 bls. from Hamburg; R. F. Downing & Co., 122 bls. from Manchester; Giegle Trans, 67 bls. from Havre; London & Liverpool Bank of Commerce, 56 bls. from Hull; Equitable Trust Co., 52 bls. from Hamburg; International Acceptance Bank, 407 bls. from Hamburg, 151 bls. from Manchester and 25 bls. from Antwerp; First National Bank of Boston, 57 bls. from Marseilles; Irving National Bank, 31 bls. from London, 78 bls. from Liverpool, 41 bls. from Hamburg. 246 bls. from Marseilles and 70 bls. from Buenos Aires; Bank of New York, 100 bls. from Barcelona; New York Trust Co., 56 bls. from Algiers; Daniel I. Murphy, 56 bls. from Rotterdam; S. Birkenstein & Sons, 263 bls. from Rotterdam and 36 bls. from Antwerp; E. Butterworth & Co., 78 bls. from Rotterdam; W. Hughes & Co., 172 bls. from Antwerp; Paul Berlowitz, 217 bls. from Antwerp; Wilkinson Bros. & Co., 86 bls. from Havre; Waste Material Trading Corp., 187 bls. from Havre; M. Wolfer & Co., 37 bls. from Havana; State Bank, 21 bls. from Rotterdam and 171 bls. from Bremen; Mechanics & Metals National Bank, 351 bls. from Havre; Davies, Turner & Co., 278 bls. from Havre; Columbia Bank, 118 bls. from Havre; National City Bank, 37 bls. from Hamburg; Order, 375 bls. from London, 246 bls. from Liverpool, 56 bls. from Bremen, 19 bls. from Hamburg, 518 bls. from Manchester, 45 bls. from Barcelona, 150 bls. from Havre, 141 bls. from Rotterdam and 220 bls. from Marseilles.

Miscellaneous Paper Stock

Daniel M. Hicks, Inc., 81 bls. from Antwerp; Irving National Bank, 1,287 bls. from Antwerp and 15 bls. from Manchester; International Acceptance Bank, 42 bls. from Glasgow; Equitable Trust Co., 456 bls. from London, 35 bls. from Rotterdam, 84 bls. from Newcastle and 191 bls. from Bristol; London and Liverpool Bank of Commerce, 40 bls. from London and 28 bls. from Manchester; E. J. Keller Co., 336 bls. from Antwerp; Cambridge Magazine, 36 bls. from Londorf; Guaranty Trust Co., 22 bls. from Glasgow; J. Tyfe & Co., 9 bls. from Belfast; Order, 241 bls. from Hamburg, 304 bls. from Glasgow, 90 bls. from Dundee, 154 bls. from London and 121 bls. from Dublin.

Paper

Importations of paper into the United States during January were fairly large. Big shipments of wrapping paper from the Scandinavian countries and Germany continued to arrive, and there were fairly large amounts of printing, hanging and cigarette paper received. News print arrivals were fully up to the several previous months notwithstanding reports to the effect that exports from Germany to the American market had diminished considerably. Imports of paper of all kinds through the port of New York in January follow:

Cigarette

British-American Tobacco Co., 73 cs. from Liverpool; American Tobacco Co., 2,760 cs. from Bordeaux; R. J. Reynolds Tobacco Co., 1,720 cs. from St. Nazaire; P. J. Schweitzer, 248 cs. from Marseilles; Vovie Tobacco Co., 12 cs. from Marseilles; Surburg Co., 38 cs. from Havre; Rose & Frank Co., 210 cs. from Havre; DeManduit Paper Corp., 544 cs. from Havre; Cia Amer Tobacatera, 30 cs. from Barcelona; Southern Pacific Co., 3 cs. from Havre; Hard & Ritter, 16 cs. from Barcelona; G. A. Henshaw & Sons, 90 cs. from Liverpool; Order, 5 cs. from Marseilles and 40 cs. from Barcelona.

Printing

Chemical National Bank, 1,061 rolls from Rotterdam and 2,501 rolls from Hamburg; Chatham & Phenix National Bank, 122 rolls from Hamburg; Irving National Bank, 137 rolls from Hamburg; Ironbound Trust Co., 50 rolls from Gothen-

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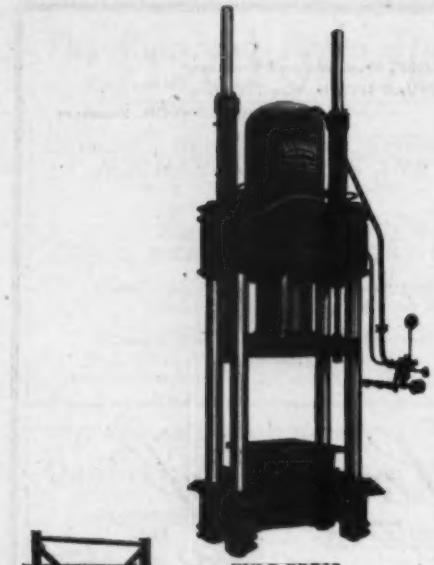
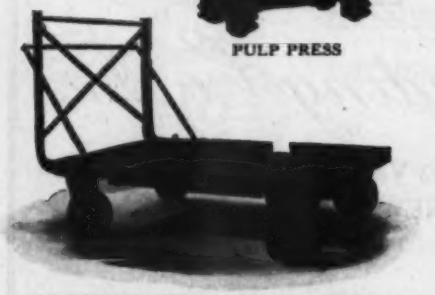
AND

Finnish Wood Pulp Union
Helsingfors, Finland



PULP PRESS



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HYDRAULIC PRESSES

Pulp—Sulphite—Baling

PULP CARRYING TRUCKS

Pulp Press Details

All steel construction except ram, which is chilled iron with ground working surface and outside packed.
Pressed table is 33" wide by 46" long.
Stroke of ram is 48".
Equipped with Southwark two pressure three-way valves for controlling.
Either single or two pressure systems available.
Provided with bottom pressing table and improved drop track which eliminates manual control.

Other Pulp and Paper Mill Equipment manufactured by Southwark.

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Expert Engineers to Design, Build and Lay Out
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Barkers—Chippers—Grinders—Shredders
Wood Washers—Chip Crushers—Chip Screens
Wet Machines—Pumps—Agitators—Blow-off Valves
Acid-proof Bronze, Brass and Lead Fittings

Office and Factory: **CARTHAGE, N. Y.**

burg; Bankers Trust Co., 253 rolls from Hamburg; French-American Banking Corp., 783 rolls from Gefle; Ladenburg, Thalman & Co., 280 rolls from Hamburg; J. B. Harris Paper Co., 97 rolls from Hamburg and 177 rolls from Bremen; Street & Smith Publishing Co., 903 rolls from Rotterdam; Diem & Wing Paper Co., 72 rolls from Hamburg; E. Dietzgen & Co., 45 cs. from Hamburg; I. Gilman & Co., 218 rolls from Gothenburg; M. Gottesman & Co., 615 rolls from Gothenburg; H. Reeve Angel & Co., 655 rolls from Bremen, 326 rolls from Hamburg and 406 rolls from Antwerp; J. J. Scott Paper Co., 74 rolls from Antwerp; Parsons & Whittemore, 9,562 rolls from Bremen; Virginia Paper Co., 131 rolls from Bremen; W. F. Etherington & Sons, 180 cs. from Glasgow; C. Steiner, 13 cs. from Rotterdam and 96 bls. from Bremen; B. F. Drakenfeld & Co., 57 cs. from Liverpool; P. C. Zuhlke, 337 cs. from Antwerp and 19 cs. from Hamburg; L. A. Consmiller, 21 cs. from Hamburg; P. Puttmann, 2 cs. from Antwerp; New York Tribune, 340 rolls from Bremen and 83 rolls from Antwerp; Reavachuzel & Co., 267 rolls from Bremen; New York Journal of Commerce, 636 rolls from Bremen; C. H. Young Publishing Co., 381 rolls from Antwerp; L. Schulman & Co., 355 rolls from Antwerp; Oxford University Press, 2 cs. from Liverpool; Globe Shipping Co., 79 cs. from Bremen; Order, 5,307 rolls from Hamburg, 227 rolls from Glasgow, 140 rolls from Gothenburg, 201 rolls from Gefle, 46 rolls from Christiania, 2,612 rolls from Bremen and 2,714 rolls from Rotterdam.

Wrapping

Ladenburg, Thalman & Co., 4,534 bls. and 2,975 rolls from Hamburg and 595 rolls from Rotterdam; Maurice O'Meara Co., 54 bls. from Bremen and 12 rolls from Hamburg; J. B. Harris Paper Co., 96 bls. and 113 rolls from Bremen; Miller Paper Co., 1,038 rolls and 25 bls. from Hamburg; Klein Bros. Paper Co., 193 rolls and 10 bls. from Hamburg; Central New York Supply Co., 334 rolls and 23 bls. from Hamburg; M. M. Cohen, 616 bls. and 67 rolls from Hamburg; Libby & Williams Paper Co., 284 bls. from Hamburg; Great Notch Paper Co., 583 bls. from Hamburg; Thomas Barrett & Son, 36 rolls and 72 bls. from Hamburg; D. S. Walton & Co., 2,791 rolls and 8 bls. from Hamburg; W. Schall & Co., 1,697 rolls and 61 bls. from Hamburg; C. K. MacAlpine & Co., 1,561 bls. from Rotterdam and 90 rolls and 18 bls. from Gothenburg; A. E. MacAdam & Co., 480 rolls from Gothenburg; Great Atlantic and Pacific Tea Co., 392 bls. from Gothenburg; International Acceptance Bank, 147 bls. from Trondhjem and 760 bls. and 205 rolls from Drammen; Sonn, Schulman & Co., 25 bls. from Bremen; C. Steiner, 6 bls. from Bremen; C. G. Winans & Co., 961 rolls and 51 bls. from Hamburg; Chemical National Bank, 372 bls. from Hamburg; Blauvelt-Wiley Paper Mfg. Co., 111 bls. from Glasgow; L. Schulman & Co., 467 bls. from Bremen; Republic Bag and Paper Co., 716 bls. from Hamburg and 46 rolls from Bremen; Bank of America, 1,700 rolls from Hamburg; Fernstrom Paper Co., 48 bls. from Hamburg; Wilkinson Bros. & Co., 895 rolls and 277 bls. from Rotterdam, 1,733 rolls from Copenhagen and 1,279 rolls from Bremen; A. D. Morosoff, 58 bls. and 20 rolls from Rotterdam; Foreign Paper Mills, 406 bls. and 54 rolls from Hamburg; Irving National Bank, 952 bls. and 162 rolls from Hamburg and 22 bls. from Antwerp; Melby, Kuttroff & Co., 1,343 bls. from Copenhagen; J. P. Hefferman Paper Co., 549 bls. from Copenhagen; American Exchange National Bank, 107 rolls and 47 bls. from Christiania and 89 bls. from Hamburg; National City Bank, 600 bls. from Rotterdam; Chase National Bank, 820 rolls from Hamburg; Birn & Wachenheim, 450 cs. from Rotterdam; Order, 56 bls. and 1,639 rolls from Bremen, 78 bls. from Antwerp, 108 bls. from Gothenburg, 49 bls. from Trondhjem, 282 rolls from Drammen, 2,200 rolls from Rotterdam, 155 rolls from Glasgow, 567 rolls from Copenhagen, and 2,970 rolls and 769 bls. from Hamburg.

Writing

Lunham & Moore, 2 cs. from Southampton; F. C. Strype, 2 cs. from Marseilles; E. Dietzgen & Co., 56 cs. from Marseilles; F. B. Vandegrift & Co., 9 cs. from Southampton.

Drawing

Keuffel & Esser Co., 159 cs. from Hamburg and 3 cs. from Rotterdam; American Shipping Co., 4 cs. from Hamburg; Lunham & Moore, 17 cs. from London; Roneo Co., 8 rolls from London; E. Dietzgen & Co., 32 cs. from Hamburg.

Filter

E. Fougera & Co., 48 cs. from Southampton; Lunham & Moore, 21 cs. from London and 1 cs. from Southampton; Eimer & Amend, 8 cs. from Rotterdam; J. Manheimer, 23 bls. from Havre.

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Owing to substantial reductions in the cost of all materials entering into the construction of Jenssen Acid Towers, we are now building them at

NORMAL PRICES

Will YOU let us show YOU how to make MONEY by making a

BETTER ACID

Don't forget that every second sulphite mill on this continent is using our towers, so ask your neighbor what HE thinks of them.

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Notice the heavy ship channels, pressed steel tire and gear saddles securely riveted to the channel sections and the substantial construction of the tires and gears in this Paulson Barking Drum. Is it any wonder that they stand the test? If interested in barking drums now, write us. You'll be satisfied with a Paulson drum.

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The Sandy Hill Iron & Brass Works

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New York

Manufacturers of **Paper and Pulp Mill Machinery**

The BLACK-CLAWSON Co.

HAMILTON, OHIO

Builders*—Paper and Pulp Mill Machinery—*for

INCREASED PRODUCTION **SERVICE ALWAYS**

Tissue

Hensel, Bruckman & Lorbacher, 4 cs. from Hamburg; H. Reeve Angel & Co., 8 bls. from Hamburg; Iwai & Co., 7 cs. from Kobe; Lightfoot, Lehalty & Co., 3 cs. from Kobe; C. H. Wyman Shipping Co., 3 cs. from Liverpool; Meadows, Wye & Co., 4 cs. from Liverpool; G. W. Sheldon & Co., 6 cs. from Liverpool.

Photo

Gevaert Co. of America, 79 cs. from Antwerp; J. J. Gavin & Co., 7 cs. from Liverpool.

Board

Merchants Products Co., 500 bls. from Rotterdam; Bendix Paper Co., 508 bls. from Hamburg; Buschmann Bros., 448 rolls from Rotterdam; A. Bourjois & Co., 14 cs. from Havre; F. G. Prager & Co., 21 cs. from Hamburg; Wiebush Calendar Importing Co., 17 cs. from Hamburg; Maurice O'Meara Co., 11 rolls from Hamburg; F. J. Scanlan, 44 cs. from Havre; Lagerloef Trading Co., 230 rolls from Bremen; Flexideal Co., 100 cs. from Bremen; Metropolitan Import & Mfg. Co., 21 cs. from Hamburg; Norris Export & Import Co., 6 cs. from Hamburg; Southern Pacific Co., 20 bls. from Genoa; H. Bainbridge & Co., 2 cs. from London; Happel & McAvoy, 2 cs. from Havre; Wilkinson Bros. & Co., 10 cs. from Hamburg; Continental Shipping Corp., 35 cs. from Hamburg; Adrain Vuyck, 221 rolls from Rotterdam; Pulp and Paper Trading Co., 92 rolls from Rotterdam; Coty, Inc., 29 cs. from Havre; Order, 386 bls. from Hamburg.

Hanging

A. Murphy & Co., 6 cs. from Havre, 7 bls. from Southampton, 19 cs. from Liverpool and 61 bls. from Hamburg; A. C. Dodman Jr. & Co., 56 bls. from Southampton and 50 bls. from Liverpool; W. H. S. Lloyd & Co., 2 cs. from Antwerp, 173 bls. from London and 1 cs. from Liverpool; F. G. Prager & Co., 5,648 bls. from Antwerp; Erstein & Co., 5 cs. from Havre; J. W. Hampton Jr. & Co., 5 cs. from Hamburg; W. H. Kinnear, 4 cs. from Kobe; Anglo-South American Bank, 20 cs. from Antwerp; Order, 4 cs. from Antwerp.

Miscellaneous

Birn & Wachenheim, 87 cs. from Havre and 185 cs. from Bremen; P. H. Petry & Co., 19 cs. from Hamburg and 21 cs. from Havre; Japan Paper Company, 17 bls. from Havre, 42 cs. from Genoa and 20 cs. from Antwerp; Whiting-Patterson Co., 12 cs. from Havre; Borden & Riley Paper Co., 4 cs. from Antwerp; Seaman Paper Co., 13 cs. from Gothenburg; Banco de Sonora Hermoiselle, 120 cs. from Genoa; State Bank, 9 cs. from Bremen; Philadelphia National Bank, 30 cs. from Hamburg; F. Henjes, Jr., 38 cs. from Rotterdam; Quality Art Novelty Co., 35 cs. from Hamburg; Equitable Trust Co., 51 bls. from Hamburg; C. H. Boulin, 17 cs. from Havre; Blauvelt-Wiley Paper Mfg. Co., 2 bls. from Glasgow; W. Van Doorn, 78 cs. from Rotterdam; J. W. Lyon & Co., 5 bls. from Havre; R. F. Downing & Co., 4 cs. from Havre; Overton & Co., 2 cs. from Bremen; F. L. Kraemer & Co., 2 cs. from London; Irving National Bank, 4 cs. from Hamburg and 7 cs. from Antwerp; Lindt Chocolate Co., 100 bls. from Bremen; C. B. Richard & Co., 5 cs. from Hamburg.

Foreign Trade Opportunities

Additional information regarding the following foreign trade opportunities issued by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce may be obtained from the Bureau in Washington, D. C., or its branch offices. It is requested that the number of the inquiry be given at all times.

No. 4871—All grades of paper stock, such as rags and white and colored wipers, in quantities of 5 to 100 tons. England. Purchase desired. Quotations c.i.f. English port requested.

No. 4872—Toilet paper. Denmark. Purchase desired.

No. 4935—Soda and chemicals for the paper industry. India. Agency wanted. Quotations c.i.f. Calcutta. Terms: Cash against documents.

No. 4986—Rosin, turpentine and sulphur. Norway. Purchase and agency.

No. 4996—Stationery, including glazed paper and silk paper, and machinery for the manufacture of paper. Italy. Agency and purchase.

No. 5035—High grade stencil paper for use on addressing machines. Switzerland. Purchase. Quotations f. o. b. New York. Terms: Cash.

No. 5102—Machinery for cutting, printing, waxing and

Guaranteed Perfect

Draper Hollow Balanced Brass Balls

FOR STUFF PUMPS

Absolutely balanced; will not pound out of shape

Specify these when ordering new pumps.

Order these to replace worn-out balls.

We make a specialty of repairing stuff pump balls.

We also manufacture—
SOLID BRASS BALLS
IRON AND STEEL BALLS
BALL CHECK VALVES
VALVE FACING TOOLS

The Draper Manufacturing Co.

Port Huron, Mich. Petrolea, Canada

Every ball bears our registered trade-mark

Reclaiming Machinery

for the recovery end of soda and sulphate pulp mills, including:

Diffusers
Causticizers
Disc evaporators
Leaching batteries
Digesters
Incinerators
Melt Tanks
Smelters

Send for list of Kraft mills using Swenson equipment.

Evaporator Bulletin E-122 on request

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Mill Supplies, Etc.

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TICONDEROGA, N. Y., U. S. A.

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WARREN IMPROVED CALENDER DOCTORS

With Flexible Blades, Universal Adjustment and Control (PATENTED)

WARREN IMPROVED PATENT DOUBLE DRUM WINDERS

Patent BALL VALVE Hydrant
Stock Circulating Systems *and*
other Paper Mill Specialties

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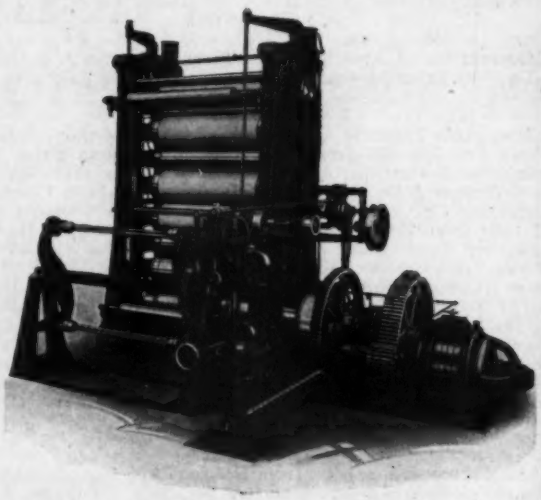
SUPER CALENDERS



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FLORENCE, MASS., U. S. A.

Holyoke Machine Co. HOLYOKE MASS.

MAKERS OF

Improved Machinery for Wood Pulp, Paper Mills, Paper Converters, Printers and Lithographers

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CALENDERS
FOR FINISHING ALL
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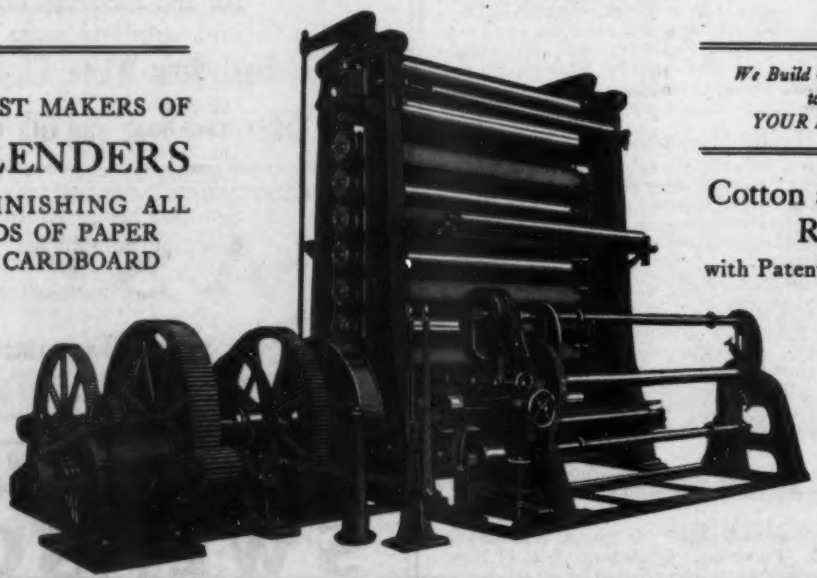

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Cotton and Paper
Rolls
with Patented Fastenings

packing in paper cylinders 500 milk bottle disks and white wood pulp board suitable for milk bottle stoppers. New Zealand. Purchase. Quotations c. i. f. New Zealand port with f. o. b. value for customs purposes. Terms: Cash against documents at port of delivery.

No. 5103—Roofing paper. Poland. Purchase and agency. Quotations c. i. f. Danzig. Correspondence German or Polish.

No. 5104—News print paper and general paper supplies for printing. Chile. Purchase. Quotations c. i. f. Chilean port. Payment to be made by New York draft. Correspondence Spanish.

No. 5173—News print paper. Brazil. Agency desired. Quotations c. i. f. Brazilian port.

Increasing Demand for Rolls

Those interested in the manufacture of paper and board, also in its wholesale distribution, have noticed that there is an increasing market for rolls for many purposes where sheets were formerly employed. It must be noted also that certain applications of paper will always call for sheets rather than rolls, but many new mechanical appliances have come forward involving continuous operation, which appliances can best be fed from a roll rather than from individual sheets.

This is a reversal of the old-time condition where the bulk of the product of a paper mill was put up in sheet form, and rolls were in little or no demand; but owing to the introduction of machines such as roll-printing machines, automatic wrapping machines, adding machines, recording and registering machines, bag, envelope, carton and tube machines, and a host of others, the tonnage demand in roll form has increased enormously.

The customer in the old days was not over-critical as to the character of the rolls themselves so long as the quality of the paper in the rolls was all right. Mechanical processes of modern invention for converting paper into its many products, as they multiplied in number and increased in speed, became more exacting in the matter of accurate width of the paper, clean-cut edges, firm and even rolls, absence of wrinkles and other defects in the surface of the paper. The production of these rolls to meet the consumer's specification has come to be quite a problem with the paper manufacturer.

The customer today is necessarily critical as to the kind of rolls he receives. His preference for accurate rolls arises from the fact that rolls which are smoothly and evenly wound, perfectly round, firm and true and clean-cut on the edges, and free of wrinkles, permit a higher speed and a lower percentage of "broke" on machines to which they are fed.

The problem confronting manufacturers and converters of paper, also wholesale distributors, is how to obtain rolls which will meet the most exacting specifications of the customer, also how to do this work at a minimum operating cost and a minimum loss in "broke" and rejects. This problem deserves more serious consideration than has been devoted to it in the past when the slitting and roll-winding process was of no considerable importance. In fact, the consideration of this problem is becoming the more necessary as the tonnage demand for paper in rolls increases and the specification for accuracy in rolls becomes more emphatic, and the competition for business more strenuous. The successful answer to this problem often means the retaining and the increasing of desirable orders.

The several manufacturers of roll-winding and slitting machines are keeping abreast of the rapid advances in the requirements for paper and board in rolls, and are gearing their machines to the needs of the paper manufacturer.

Note.—The above short article was prepared by Mr. James A. Cameron, president of the Cameron Machine Company. Illustrating in a graphic manner what is meant by the term "accurate rolls," we have recently received a roll made on a Cameron stock machine. This roll is 1¾ inch wide by 10 inches in diameter, and is as smooth and perfect, with corners as square as if it had been a piece of marble chiseled and polished with utmost accuracy.—Editor.

Strike Situation in Sweden Alarming

The following cablegram telling of the spread of the Swedish pulp industry strike was received recently by the American Paper and Pulp Association:

"Arbitration meetings accomplished nothing. Eleven thousand men, equaling two thirds workmen pulp industry now striking. Unless arbitration successful employers of whole industry will declare lockout twenty-ninth."

Up to the time of going to press we have not learned whether or not the employers have made good their threat.

Experienced man—To take charge of Finishing Room. Must have had experience with finishing of Bond and High Finished Book Papers. Write, giving age and experience.
The Employment Department,
THE CHAMPION COATED PAPER CO.

Superintendent-Manager Wanted
Bi-sulphite liquor by-product plant. Must be familiar with various processes and have had successful experience in plant operation. State salary desired, experience, etc. Apply Box 45, The Paper Industry.

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Write for Handbook of Conveyor Practice
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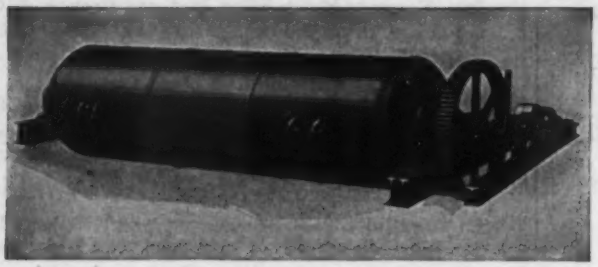

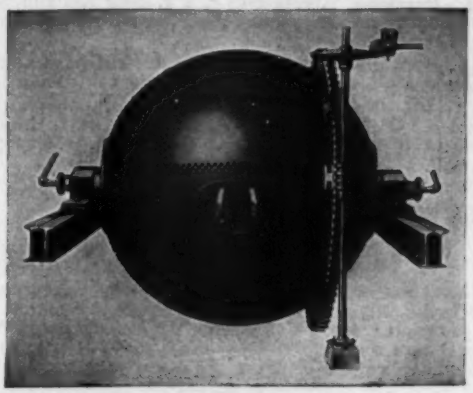

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BIGGS CYLINDER and Globe Rotary Bleaching Boilers are made to withstand working pressures greatly in excess of those required in every-day service. They have ample margin of safety to resist chemical action and corrosion from lime, soda ash, etc. Biggs equipment in practically every important paper plant in the country; repeat orders for "Biggs" again and again whenever new Rotary Boilers are needed; doesn't that suggest merit that's worth your while to investigate? Many installations have been in constant service for over twenty-five years with practically no expense for upkeep.

The Biggs Boiler Works Co. Akron Ohio

"Biggs Rotaries" cover the whole range of paper mill output. Profit by Biggs' long experience studying and solving paper plant engineering problems. Full particulars gladly mailed at your request.

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High Speed Newsprint Machine
166 inch wide, running at a daily average of over
1,000 ft. per minute, in mills of the
Laurentide Company, Limited, Grand'mere, Que.
Built by
DOMINION ENGINEERING WORKS, LIMITED
Montreal, Canada

Builders of Fourdriniers for Fine Papers, High Speed Newsprint Machines, Cylinder Type Board Machines and Wet Machines for Wood Pulp; Millspaugh Suction Rolls, Pope Paper Reels, etc.
Canadian Builders of I. P. Morris Turbines and High Speed Pumps; Larner-Johnson Hydraulic Valves, Large Gate and Pivot Valves.

(M-82)

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

ADHESIVES
E. F. Russ Co., Boston.
ACID RESISTING BRONZE
Eastwood Wire Mfg. Co., Belleville, N. J.
William A. Hardy & Sons, Fitchburg, Mass.
ACID RESISTING PAINT
Detroit Graphite Co., Detroit, Mich.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
AGITATOR EQUIPMENT
Moore & White Co., Philadelphia.
AIR COMPRESSORS
Hooven, Owens, Rentschler Co., Hamilton, O.
AIR CONDITIONING AND CONTROL APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Eng. Corp., New York City.
B. F. Sturtevant Co., Hyde Park, Boston.
ALKALI
Diamond Alkali Co., Pittsburgh.
Solvay Process Co., Syracuse, N. Y.
ANGLE VALVES
The Crane Company, Chicago.
Eastwood Wire Mfg. Co., Belleville, N. J.
ARCHITECTS
James L. Carey, Chicago.
Ferguson Engineers, Chicago.
Hardy S. Ferguson, New York City.
George F. Hardy, New York City.
V. D. Simons, Chicago.
Jos. H. Wallace & Co., New York City.
ASH CONVEYORS
Green Eng. Co., East Chicago, Ind.
ASSORTING TABLES
Moore and White Co., Philadelphia.
BAKELITE GEARS
D. O. James Mfg. Co., Chicago.
BALL CHECK VALVES
The Draper Mfg. Co., Port Huron, Mich.
BALLS (Brass)
The Draper Mfg. Co., Port Huron, Mich.
BALLS (Iron and Steel)
The Draper Mfg. Co., Port Huron, Mich.
BANDLESS ROLLS
Dayton Globe Iron Wks., Dayton, O.
Valley Iron Works Co., Appleton, Wis.
BARKERS
Holyoke Machine Co., Holyoke, Mass.
Union Iron Works, Bangor, Me.
Valley Iron Works Co., Appleton, Wis.
BEARINGS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
T. B. Wood's Sons Co., Chambersburg, Pa.
BEARINGS (Ball)
S. K. F. Industries, New York City.
BEATER BARS (Bronze)
American Manganese Bronze Co., Philadelphia.
BEATER ROLL FILING
Taylor Wharton Iron & Steel Co., Highbridge, N. J.
BEATING, WASHING AND BLEACHING ENGINES
Dayton Beater & Hoist Co., Dayton, O.
Dayton Globe Iron Wks., Dayton, O.
Holyoke Machine Co., Holyoke, Mass.
Noble & Wood Machine Co., Hoosick Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.
BEATERS (Continuous)
Claflin Engineering Co., Lancaster, O.
BELT DRIVES
The Falls Clutch & M. Co., Cuyahoga Falls, O.
The Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.
T. B. Wood's Sons Co., Chambersburg, Pa.
BELTING (Balata)
Manheim Mfg. & Belting Co., Manheim, Pa.
BELTING (Rubber)
B. F. Goodrich Rubber Co., Akron, O.
The Republic Rubber Co., Youngstown, Ohio.
Voorhees Rubber Belt Co., Jersey City, N. J.
BELTING (Silent Chain)
Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.
BELT LACING
Flexible Steel Lacing Co., Chicago.
BLEACHING BOILERS
The Biggs Boiler Works Co., Akron, O.
BLEACHING POWDER
Pennsylvania Salt Mfg. Co., Philadelphia.
BLEACHING (Propellers)
Moore and White Co., Philadelphia.
BLEEDER TURBINE
Moore Steam Turbine Corp., Wellsville, N. Y.
BLOWERS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Moore Steam Turbine Corp., Wellsville, N. Y.
J. O. Ross Eng. Corp., New York City.
B. F. Sturtevant Co., Hyde Park, Boston.
BLOW-OFF VALVES
Henry Horkman, Neenah, Wis.
BOARD MACHINES
Beloit Iron Works, Beloit, Wis.
Black-Clawson Co., Hamilton, O.
Valley Iron Works, Appleton, Wis.
BOILERS
J. F. Davis, Chicago.
BOILERS (Electric)
Electric Furnace Con. Co., Philadelphia.
BRASS WIRE CLOTH
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, O.
W. S. Tyler Co., Cleveland, O.
BRICK AND CONCRETE PAINT
Detroit Graphite Co., Detroit, Mich.
BRIMSTONE
Union Sulphur Co., New York City.
BRONZE CASTINGS
Eastwood Wire Mfg. Co., Belleville, N. J.
BUCKETS (Elevator)
Hendricks Mfg. Co., Carbondale, Pa.
Robins Conveying Belt Co., New York City.
CALENDERS
Beloit Iron Works, Beloit, Wis.
Holyoke Machine Co., Holyoke, Mass.
Norwood Eng. Co., Florence, Mass.
Smith & Winchester Mfg. Co., So. Windham, Conn.
CALENDER DOCTORS
Ticonderoga Machine Works, Ticonderoga, N. Y.
CALENDER ROLLS
Holyoke Machine Co., Holyoke, Mass.
CASEIN
Casein Mfg. Co., New York City.
CASTINGS (Iron & Brass)
Smith & Winchester Mfg. Co., So. Windham, Conn.
CASTINGS (Brass and Bronze)
Eastwood Wire Mfg. Co., Belleville, N. J.
CASTINGS (Grey Iron)
Nordberg Mfg. Co., Milwaukee, Wis.
Robins Conveying Belt Co., New York City.
CAST IRON PIPE
American Cast Iron Pipe Co., Birmingham, Ala.
CAUSTIC SODA
Diamond Alkali Co., Pittsburgh.
Edw. Hill's Son & Co., New York City.
Solvay Process Co., Syracuse, N. Y.
CEMENT
Smith & Winchester Mfg. Co., So. Windham, Conn.
CEMENT PAINT
Detroit Graphite Co., Detroit, Mich.
CENTRIFUGAL PUMPS
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
E. M. Cross Mach. Co., Berlin, N. H.
Glens Falls Machine Works, Glens Falls, N. Y.
Ingersoll-Rand Co., New York City.
Valley Iron Works Co., Appleton, Wis.
CHAINS
The Union Chain & Mfg. Co., Sandusky, O.
CHAIN DRIVES
Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.
CHAIN GRATES
Green Eng. Co., East Chicago, Ind.
CHEMICALS
Diamond Alkali Co., Pittsburgh.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
Hercules Powder Co., New York City.
Merrimac Chemical Co., Boston.
Perkins-Goodwin Co., New York City.
Wing & Evans, Inc., New York City.
CHEMICAL STONEWARE
Maurice A. Knight, East Akron, O.
CHIPPERS
Holyoke Machine Co., Holyoke, Mass.
Union Iron Works, Bangor, Me.
Valley Iron Works Co., Appleton, Wis.
CLAYS AND FILLERS
Daniel M. Hicks, New York City.
CHLORINE (Liquid)
Mathieson Alkali Wks., Inc., New York City.
COAL BUNKERS
The Brownhoist Co., Cleveland, O.
COAL CRUSHERS
Orton & Steinbrenner Co., Chicago.
COAL & ASH HANDLING SYSTEMS
The Brown Hoisting Mach. Co., Cleveland, O.
Godfrey Conveyor Co., Elkhart, Ind.
Link Belt Co., Chicago.
COATED PAPERS
Watervliet Paper Co., Watervliet, Mich.
CONCRETE FLOOR HARDENER
Detroit Graphite Co., Detroit, Mich.
CONCRETE PAINT
Detroit Graphite Co., Detroit, Mich.
CONDENSERS
Nordberg Mfg. Co., Milwaukee, Wis.
CONSULTING ENGINEERS
James L. Carey, Chicago.
Hardy S. Ferguson, New York City.
Ferguson Engineers, Chicago.
George F. Hardy, New York City.
V. D. Simons, Chicago.
Jos. H. Wallace & Co., New York City.
CONSULTING ENGINEERS (Power)
E. M. Baxter, Cleveland.
Ferguson Engineers, Chicago.
V. D. Simons, Chicago.
CONTRACTORS (Building)
The Austin Co., Cleveland, O.
H. K. Ferguson Co., Cleveland, O.
CONVEYORS
The Brown Hoisting Mach. Co., Cleveland, O.
Godfrey Conveyor Co., Elkhart, Ind.
Link Belt Co., Chicago.
Union Chain & Mfg. Co., Sandusky, O.
CONVEYORS (Belt)
Robins Conveying Belt Co., New York City.
CORDUROY WIRE CLOTH
The W. S. Tyler Co., Cleveland, O.
CORES (Collapsible)
Smith & Winchester Mfg. Co., So. Windham, Conn.
CORLISS ENGINES
Nordberg Mfg. Co., Milwaukee, Wis.
COUPLINGS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
COUPLINGS (Shaft)
T. B. Wood's Sons Co., Chambersburg, Pa.
CRANES (Auto)
The Byers Mach. Co., Ravenna, O.
CRANES (Crawling Tractor)
The Brown Hoisting Mach. Co., Cleveland, O.
Industrial Works, Bay City, Mich.
CRANES (Dipper Arm)
Industrial Works, Bay City, Mich.
Orton & Steinbrenner Co., Chicago.
CRANES (Locomotive)
Brownhoist Co., Cleveland, O.
Link Belt Co., Chicago.
Industrial Works, Bay City, Mich.
Orton & Steinbrenner Co., Chicago.
CRANES (Overhead)
Northern Engineering Works, Detroit, Mich.
CREOSOTING CYLINDERS
Biggs Boiler Works Co., Akron, O.
CRUSHERS (Coal and Coke)
Robins Conveying Belt Co., New York City.
CUTTERS
Smith & Winchester Mfg. Co., So. Windham, Conn.
CYLINDER MACHINES
Smith & Winchester Mfg. Co., So. Windham, Conn.
CYLINDER MOLDS (New or Repaired)
Appleton Wire Works, Appleton, Wis.
Beloit Iron Works, Beloit, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Glens Falls Machine Works, Glens Falls, N. Y.
The Lindsay Wire Weaving Co., Cleveland, O.
The W. S. Tyler Co., Cleveland, O.
Wisconsin Wire Works, Appleton, Wis.
DANDY ROLLS
Appleton Wire Works, Appleton, Wis.
Central Mfg. Co., Kalamazoo, Mich.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, O.
The W. S. Tyler Co., Cleveland, O.
DIE PRESSES
Smith & Winchester Mfg. Co., So. Windham, Conn.
DIESEL ENGINES
Nordberg Mfg. Co., Milwaukee, Wis.
DIGESTERS
The Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago.
Manitowoc Eng. Works, Manitowoc, Wis.
DIGESTER COVERS
Eastwood Wire Mfg. Co., Belleville, N. J.
DRAFT GAUGES
The Foxboro Co., Foxboro, Mass.
DRAINAGE SYSTEMS
The Fulton Engineering Co., Middletown, Ohio.
DRUM WINDERS (Drives)
Beloit Iron Works, Beloit, Wis.
Ticonderoga Machine Co., Ticonderoga, N. Y.
DRYERS
Smith & Winchester Mfg. Co., So. Windham, Conn.
DRYERS (Rotary)
Biggs Boiler Works Co., Akron, O.
DRYER EXHAUST
Nash Engineering Co., So. Norwalk, Conn.
DRYER FELTS
Appleton Woolen Co., Appleton, Wis.
Fitchburg Duck Mills, Fitchburg, Mass.
F. C. Huyck & Sons, Albany, N. Y.
Lockport Felt Co., Lockport, N. Y.
Shuler and Benninghofen, Hamilton, O.
DRYING MACHINES
Drying Machine Corp. of Am., Inc., New York City.
DRYING SYSTEMS
J. O. Ross Eng. Corp., New York City.
DYESTUFFS
E. I. Du Pont de Nemours & Co., Wilmington, Del.
A. Klipstein and Co., New York City.
H. A. Metz & Co., Inc., New York City.
National Aniline & Chem. Co., New York City.
Standard Ultramarine Co., Huntington, W. Va.
Sandoz Chemical Works, New York City.
The White Tar Aniline Corp., New York City.
DUST COLLECTING SYSTEMS
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
ELECTRIC HOISTS
Link-Belt Co., Chicago.
Northern Engineering Co., Detroit, Mich.
ELECTRIC STEAM GENERATORS AND BOILERS
Electric Furnace Construction Co., Philadelphia.
ELECTRICAL MACHINERY
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
ELEVATORS
The Brown Hoisting Mach. Co., Cleveland, O.
Link Belt Co., Chicago.
ELEVATORS (Portable)
New Jersey Pty. & Mach. Co., New York City.

The Noble & Wood Machine Co

Hoosick Falls, New York

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Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

ENGINES
American Blower Co., Detroit, Mich.
Hooven, Owens, Rentschler Co., Hamilton, O.

ENGINES (Pumping)
Hooven, Owens, Rentschler Co., Hamilton, O.

ENGINES (Repair)
Hooven, Owens, Rentschler Co., Hamilton, O.

ENGINES (Steam)
Hooven, Owens, Rentschler Co., Hamilton, O.

ENGINEERS
B. M. Baxter, Cleveland, O.
James L. Carey, Chicago.
George F. Hardy, New York City.
Hardy S. Ferguson, New York City.
Ferguson Engineers, Chicago.
Management Eng. & Dev. Co., Dayton, O.
T. D. Simons, Chicago.
Stebbins Engineering & Mfg. Co., Watertown, N. Y.
Jos. H. Wallace & Co., New York City.

ENGINEERS (Structural)
The Austin Co., Cleveland, O.
H. K. Ferguson Co., Cleveland, O.

ENGINEERS (Valuation)
Ford, Bacon & Davis, Inc., New York City.

EVAPORATORS
Swenson Evaporator Co., Chicago.

EXHAUSTERS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Eng. Corp., New York City.

FANS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Eng. Corp., New York City.
B. F. Sturtevant Co., Hyde Park, Boston.

FELTS AND JACKETS
Appleton Woolen Co., Appleton, Wis.
Fitchburg Duck Mills, Fitchburg, Mass.
F. C. Huyck & Sons, Albany, N. Y.
Lockport Felt Co., Newfane, N. Y.
Shuler and Benningh ofen, Hamilton, O.
Waterbury Felt Co., Skaneateles Falls, N. Y.

FELT AND WIRE GUIDES
Moore & White Co., Philadelphia.

FILTER (Continuous Suction)
Oliver Continuous Filter Co., Los Angeles, Calif.

FILTERS (Pressure and Gravity)
Hungerford & Terry, Inc., Clayton, N. J.
Norwood Eng. Co., Florence, Mass.
The Permutit Co., New York City.

FLAT WALL PAINT
Detroit Graphite Co., Detroit, Mich.

FLOUR SACK MACHINERY
Smith & Winchester Mfg. Co., So. Windham, Conn.

FLOW METERS
Republic Flow Meters Co., Chicago.

FLUID METERS
Bailey Meter Co., Cleveland, O.

FLY BARS
Noble and Wood Mach. Co., Hoosick Falls, N. Y.

FOURDRINIER MACHINES
Smith & Winchester Mfg. Co., So. Windham, Conn.

FOURDRINIER WIRES
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, O.
The W. S. Tyler Co., Cleveland, O.
Wisconsin Wire Works, Appleton, Wis.

FRICTION CLUTCHES
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Moore and White Co., Philadelphia
A. Plamondon Mfg. Co., Chicago.
T. B. Wood's Sons Co., Chambersburg, Pa.

GEARS
Cleveland Worm Gear Co., Cleveland, O.
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Foote Bros. Gear & Machine Co., Chicago.
D. O. James Mfg. Co., Chicago.
Meisel Press Mfg. Co., Boston.
A. Plamondon Mfg. Co., Chicago
Robbins Conveying Belt Co., New York City.

GEARS (Bakelite)
Foote Bros. Gear & Mach. Co., Chicago.

GEARS (Heavy Duty)
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

GEARS (Rawhide)
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

GEARS, REDUCTION
Moore Steam Turbine Corp., Wellsville, N. Y.

GEARS (Silent Chain)
Morse Chain Co., Ithaca, N. Y.

GEARS (Worm)
Cleveland Worm & Gear Co., Cleveland, O.

GENERATING SETS
Moore Steam Turbine Corp., Wellsville, N. Y.

GENERATORS (Turbo)
Moore Steam Turbine Corp., Wellsville, N. Y.

GLUES
E. F. Russ Co., Boston.

GRAB BUCKETS
The Brown Hoisting Mach. Co., Cleveland, O.
The Byers Mach. Co., Ravenna, O.
Industrial Works, Bay City, Mich.
Orton & Steinbrenner Co., Chicago

GRANITE ROLLS
Jones Bros. Co., Barre, Vt.

GREASE CUPS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Hunter Pressed Steel Co., Lansdale, Pa.

GRINDERS
Glens Falls Machine Works, Glens Falls, N. Y.
Holyoke Machine Co., Holyoke, Mass.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Union Iron Works, Bangor, Me.
Valley Iron Works, Appleton, Wis.

GRINDSTONES
The Sinclair-Low Co., Lisbon, Ohio.

HAMMERS (Double Acting Steam Pile)
Industrial Works, Bay City, Mich.

HANGERS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
T. B. Wood's Sons Co., Chambersburg, Pa.

HEAT RESISTING PAINTS
Detroit Graphite Co., Detroit, Mich.
The Franklin Paint Co., Cleveland, O.

HEATERS (Open Steam)
Bigge Boiler Works Co., Akron, O.

HEATING SYSTEMS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
J. O. Ross Engineering Corp., New York City.
Skinner Bros. Co., St. Louis, Mo.

HOISTS (Electric)
Northern Eng. Works, Detroit, Mich.

HOISTING AND CONVEYING SYSTEMS
The Brown Hoisting Mach. Co., Cleveland, O.
Link-Belt Co., Chicago.
Northern Engineering Co., Detroit, Mich.

HOSE
Voorhees Rubber Co., Jersey City, N. J.

HOISTING AND MONORAIL SYSTEMS
The Brown Hoisting Machine Co., Cleveland, O
Northern Eng. Works, Detroit, Mich.

HOUSE PAINT
Detroit Graphite Co., Detroit, Mich.

HYDRAULIC TURBINES
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Holyoke Machine Co., Holyoke, Mass.

IRON CASTINGS
Beloit Iron Works, Beloit, Wis.
Valley Iron Works Co., Appleton, Wis.

IRON FILLER
Detroit Graphite Co., Detroit, Mich.

IRON & STEEL SUPPLIES
Brown-Wales Co., Boston.

JORDAN ENGINES
Jones & Sons Co., E. D., Pittsfield, Mass.
Noble and Wood Mach. Co., Hoosick Falls, N. Y.
Smith & Winchester Mfg. Co., So. Windham, Conn.
Shartle Bros. Machine Co., Middletown, O.

JORDAN FILLINGS
Jones & Sons Co., E. D., Pittsfield, Mass.
Noble and Wood Mach. Co., Hoosick Falls, N. Y.
The Shartle Bros. Mach. Co., Middletown, O.
Taylor Wharton Iron & Steel Co., Highbridge, N. J.

JORDAN FILLINGS (Bronze)
American Manganese Bronze Co., Philadelphia.

KETTLES (Steam Jacketed)
The Bigge Boiler Works Co., Akron, O.
Littleford Bros., Cincinnati, O.

KNIVES
Simonds Mfg. Co., Fitchburg, Mass.

KRAFT AND SULPHATE PULPS
The Borregaard Co., Inc., New York City.

LABORATORY MACHINERY
Noble and Wood Mach. Co., Hoosick Falls, N. Y.

LAYBOYS
Moore and White Co., Philadelphia.

LIGHT REFLECTING PAINT
Detroit Graphite Co., Detroit, Mich.

LIQUID CHLORINE
Mathieson Alkali Works, Inc., New York City.

LUBRICATING GRAPHITE
Detroit Graphite Co., Detroit, Mich.

LUBRICATING GREASE
The Keystone Lubricating Co., Philadelphia.
Robbins Conveying Belt Co., New York City.

MACHINE DRYER TEMP. CONTROL
Open Coil Heater and Purifier Co., Indianapolis, Ind.

MACHINE PAINTS
Detroit Graphite Co., Detroit, Mich.

MECHANICAL DRAFT APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
B. F. Sturtevant Co., Hyde Park, Boston.

MECHANICAL PULP
J. Andersen & Co., New York City.
The Borregaard Co., Inc., New York City.

MECHANICAL RUBBER GOODS
Voorhees Rubber Co., Jersey City, N. J.

METAL PROTECTING PAINTS
Detroit Graphite Co., Detroit, Mich.

MILL ARCHITECTS
Stebbins Engineering & Mfg. Co., Watertown, N. Y.

MILL WHITE
Detroit Graphite Co., Detroit, Mich.
E. I. Du Pont de Nemours & Co., Wilmington, Del
St. Louis Surfacer & Paint Co., St. Louis, Mo
U. S. Gutta Percha Co., Paintes, Providence, R. I.

NAVAL STORES
Hercules Powder Co., Wilmington, Del.

OIL CUPS
Hunter Pressed Steel Co., Lansdale, Pa.

OIL STORAGE SYSTEMS
Bigge Boiler Works Co., Akron, O.

PAINTS
Detroit Graphite Co., Detroit, Mich.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
St. Louis Surfacer & Paint Co., St. Louis, Mo.
U. S. Gutta Percha Paint Co., Providence, R. I.

PAPER BAG MACHINERY
Smith & Winchester Mfg. Co., So. Windham, Conn.

PAPER CUTTERS & SLITTERS
Beloit Iron Works, Beloit, Wis.
Hamblet Machine Co., Lawrence, Mass.
Meisel Press Mfg. Co., Boston, Mass.
Smith & Winchester Mfg. Co., South Windham, Conn.

PAPER EXPORTERS AND IMPORTERS
E. J. Keller Company, New York City.
Lagerloef Trading Co., New York City.

PAPER MACHINES
Bayley & Sewall Co., Watertown, N. Y.
Beloit Iron Works, Beloit, Wis.
The Black-Clawson Co., Hamilton, O.
Pusey & Jones Co., Wilmington, Del.
Smith & Winchester Mfg. Co., South Windham, Conn.
Valley Iron Works, Appleton, Wis.

PAPER MACHINE DRIVES
Harland Eng. Co., Montreal, Can.
Nordberg Mfg. Co., Milwaukee, Wis.
Westinghouse Elec. & Mach. Co., East Pittsburgh, Pa.

PAPER MANUFACTURERS
Eastern Manufacturing Co., New York City.
Hammermill Paper Co., Erie, Pa.
Marathon Paper Mills Co., Rothschild, Wis.
Munising Paper Co., Munising, Mich.
Nekoosa-Edwards Mfg. Co., Nekoosa, Wis.
Oxford Paper Co., New York City.
Watervliet Paper Co., Watervliet, Mich.
Wausau Sulphate Fibre Co., Mosinee, Wis.

PAPER MANUFACTURERS' SUPPLIES
J. Andersen & Co., New York City.
The Borregaard Co., Inc., New York City.
Diamond Alkali Co., Pittsburgh.
E. J. Keller Company, New York City.
Mendelson Bros. Paper Stock Co., Chicago.
Paper Trading Co., Boston.
Pennsylvania Salt Mfg. Co., Philadelphia.
Perkins-Goodwin Co., New York City.
H. R. Wadsworth New York City.

PAPER STOCK CUTTERS
Taylor, Stiles & Co., Riegelsville, N. J.

PAPER TESTERS
Thwing Instrument Co., Philadelphia.

PARCHMENT MANUFACTURERS
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.

PENSTOCKS
The Bigge Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago.
Riter-Conley Co., Pittsburgh.

PERFORATED METALS
Hendrick Mfg. Co., Carbondale, Pa.
Charles Mundt & Sons, Jersey City, N. J.

PERFORATORS
Meisel Press Mfg. Co., Boston.

PILLOW BLOCKS
T. W. Wood's Sons Co., Chambersburg, Pa.

PILE DRIVERS
Industrial Works, Bay City, Mich.

PINIONS
Foote Bros Gear & Mach. Co., Chicago.

PIPE JOINT CEMENT
Detroit Graphite Co., Detroit, Mich.

PIPE RIVETED STEEL
The Bigge Boiler Works, Akron, O.

PIPING EQUIPMENT
Pittsburgh Piping & Equip. Co., Pittsburgh.

PIPING SYSTEMS INSTALLED
Pittsburgh Piping & Equip. Co., Pittsburgh.

PIPE THREADING & CUTTING MACHINERY
Toledo Pipe Threading Machine Co., Toledo, O.

PNEUMATIC CHIP HANDLING SYSTEMS
Bayley Mfg. Co., Milwaukee, Wis.

POWER TRANSMISSION
The Carlyle Johnson Machine Co., Manchester, Conn.
Dodge Mfg. Co., Mishawaka, Ind.
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Link-Belt Co., Chicago.
D. O. James Mfg. Co., Chicago.
A. Plamondon Mfg. Co., Chicago.
Valley Iron Works, Williamsport, Pa.
T. B. Wood's Sons Co., Chambersburg, Pa.

PRESERVATIVE PAINTS
Detroit Graphite Co., Detroit, Mich.

PRINTING PRESSES
Meisel Press Mfg. Co., Boston.

PULLEYS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
T. B. Wood's Sons Co., Chambersburg, Pa.

PULP (Chemical)
J. Andersen & Co., New York City.
The Borregaard Co., Inc., New York City.

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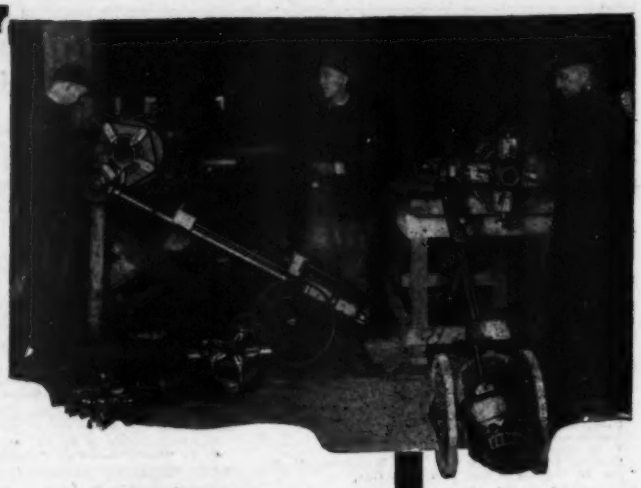

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THE TOLEDO PIPE THREADING MACHINE CO.

Toledo, Ohio — New York Office, 50 Church St.

RETURN TUBULAR LOCOMOTIVE BOILERS WATER TUBE SCOTCH MARINE

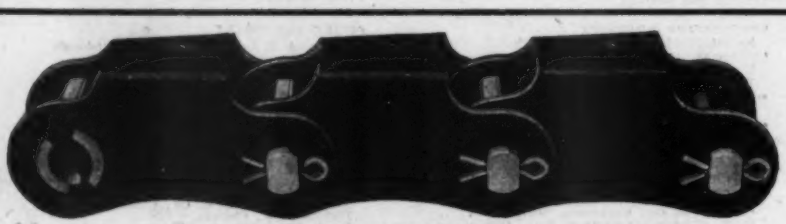
A LARGE STOCK OF HIGH-GRADE BOILERS OF PRACTICALLY ALL SIZES, TYPES AND MAKES, TAKEN OVER FROM DU PONT CHEMICAL COMPANY'S AND OTHER PLANTS WITH PRODUCTION RECORDS — RECONDITIONED, OFFERED SUBJECT TO ANY INSPECTION, AVAILABLE NOW!

"SAVE TIME AND MONEY ON YOUR POWER INSTALLATION — LET DAVIS FURNISH THE BOILERS"

LONG DISTANCE TELEPHONE RANDOLPH 2233

J. F. DAVIS

1122-1123-1124 HARRIS TRUST BUILDING CHICAGO, ILL.



"The Chain of Double Life"

Why Double Life?

When the pins and bushings in Union Steel Chains are considerably worn on the one side they can be turned half a revolution, thus bringing their unworn sides into service and practically renewing the chain; later they can be replaced with new wearing parts at small expense. Union Steel Chains invariably give longer service per dollar of cost; that's why they are used by the leaders in all industries.

UNION STEEL SPROCKET CHAINS

The chains with the substantial links and large case-hardened bearings. All sizes and capacities from one-inch pitch to 1,000,000 pounds ultimate strength.

Roller Chains; Bushing Chains; Elevator Chains; Conveyor Chains; Barking Drum Chains; Monel Metal Chains and Elevator Buckets; Cast Tooth Sprockets; Cut Tooth Sprockets; Renewable Tooth Sprockets; Elevating and Conveying Machinery

THE UNION CHAIN & MANUFACTURING COMPANY SANDUSKY, OHIO, U. S. A.

Registered UNION Trade Mark

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

B. J. Keller Company, New York City.
Lagerloef Trading Co., New York City.
Price & Pierce, Ltd., New York City.
The Pulp & Paper Trading Co., New York City.

PULP AND PAPER MILL MACHINERY
Beloit Iron Works, Beloit, Wis.
The Biggs Boiler Works Co., Akron, O.
The Black-Clawson Co., Hamilton, Ohio.
Carthage Mach. Co., Carthage, N. Y.
Davis, Frank H., Cambridge, Mass.
Dominion Engineering Works, Ltd., Montreal, Canada.
Downingtown Mfg. Co., E. Downingtown, Pa.
Glens Falls Machine Works, Glens Falls, N. Y.
Improved Paper Machinery Co., Nashua, N. H.
Moore & White Co., Philadelphia.
Nashville Industrial Corp., Jacksonville, Tenn.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Noble & Wood Machine Co., Hoosick Falls, N. Y.
Pusey & Jones Co., Wilmington, Del.
Sandusky Fdry. & Mach. Co., Sandusky, O.
The Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.
Union Iron Works, Bangor, Me.
Valley Iron Works, Appleton, Wis.
Western Marine & Salvage Co., Alexandria, Va.

PULP GRINDERS
Glens Falls Machine Works, Glens Falls, N. Y.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Union Iron Works, Bangor, Me.

PULP PRESSES
Southwork Foundry & Machine Co., Philadelphia.

PULP STONES
Smallwood-Low Stone Co., Lisbon, O.

PUMPS (Boiler Feed)
Moore Steam Turbine Corp., Wellsville, N. Y.
The Goulds Mfg. Co., Seneca Falls, N. Y.
Taber Pump Co., Buffalo, N. Y.

PUMPING MACHINERY
Hooven, Owens, Rentschler Co., Hamilton, O.

PUMPS (Steel)
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.
Glens Falls Machine Works, Glens Falls, N. Y.
The Goulds Mfg. Co., Seneca Falls, N. Y.
Gregg Pump Co., Kansas City, Mo.
Smith & Winchester Mfg. Co., So. Windham, Conn.
Taber Pump Co., Buffalo, N. Y.

PUMPS (Centrifugal)
American Steam Pump Co., Battle Creek, Mich.
Aurora Pump & Mfg. Co., Aurora, Ill.
Buffalo Steam Pump Co., Buffalo, N. Y.
Cross, E. M., Mach. Co., Berlin, N. H.
DeLaval Steam Pump Co., Trenton, N. J.
Fairbanks, Morse & Co., Chicago.
The Goulds Mfg. Co., Seneca Falls, N. Y.
Moore Steam Turbine Corp., Wellsville, N. Y.
Smith & Winchester Mfg. Co., So. Windham, Conn.
Taber Pump Co., Buffalo, N. Y.

PUMPS (Deep Well)
Aurora Pump & Mfg. Co., Aurora, Ill.
A. D. Cook & Co., Inc., Lawrenceburg, Ind.
Gregg Pump Co., Kansas City, Mo
The Goulds Mfg. Co., Seneca Falls, N. Y.
Taber Pump Co., Buffalo, N. Y.

PUMPS, TURBINE
Moore Steam Turbine Corp., Wellsville, N. Y.

PUMPS (Vacuum)
American Steam Pump Co., Battle Creek, Mich.
E. M. Cross Mach. Co., Berlin, N. H.
The Goulds Mfg. Co., Seneca Falls, N. Y.
Nash Eng. Co., South Norwalk, Conn.
Taber Pump Co., Buffalo, N. Y.

RAG AND PAPER DUSTERS
Holyoke Machine Co, Holyoke, Mass.
Norwood Eng. Co., Florence, Mass.

RECLAIMING MACHINERY
Swenson Evaporator Co., Chicago.

REDUCTION GEARS
Moore Steam Turbine Corp., Wellsville, N. Y.

REELS
Smith & Winchester Mfg. Co., So. Windham, Conn.

RELIEF GAS COOLER
Ryther & Pringle Co., Carthage, N. Y.

ROLLS (Rubber Covered)
B. F. Goodrich Co., Akron, Ohio.
Stowe & Woodward Co., Upper Newton Falls, Mass.

ROLLER BEARINGS
S. K. F. Industries, New York City.

ROOF DRYING SYSTEMS
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Eng. Corp., New York City.

ROOF PAINT
Detroit Graphite Co., Detroit, Mich.

ROPE DRIVES
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Dodge Mfg. Co., Mishawaka, Ind.
T. B. Wood's Sons Co., Chambersburg, Pa.

ROTARY BLEACHING BOILERS
The Biggs Boiler Works Co., Akron, O.

ROZIN
Hercules Powder Co., Wilmington, Del.

RUST RESISTING PAINT
Detroit Graphite Co., Detroit, Mich.

RUBBER GOODS
Voorhees Rubber Mfg. Co., Jersey City, N. J.

SAVE-ALLS
Glens Falls Machine Works, Glens Falls, N. Y.

SAWS
Simonds Mfg. Co., Fitchburg, Mass.

SCREENS
The Bagley & Sewall Co., Watertown, N. Y.
Union Iron Works, Bangor, Me.

SCREENS (Perforated Metal)
Hendrick Mfg. Co., Carbondale, Pa.
Charles Mundt & Sons, Jersey City, N. J.

SCREENS (Woven Wire)
The W. S. Tyler Co., Cleveland, O.

SCREEN PLATES
Central Mfg. Co., Kalamazoo, Mich.
William A. Hardy & Sons, Fitchburg, Mass.
Union Screen Plate Co., Fitchburg, Mass.

SHAFTING
The Falls Clutch & M. Co., Cuyahoga Falls, O.
T. B. Wood's Sons Co., Chambersburg, Pa.

SHOWER PIPES
Smith & Winchester Mfg. Co., So. Windham, Conn.

SHREDDERS
Mitts & Merrill, Saginaw, Mich.

SILENT CHAIN DRIVES
The Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.

SIZE
Western Paper Makers' Chemical Co., Kalamazoo, Mich.

SLITTING AND REWINDING MACHINERY
Beloit Iron Works, Beloit, Wis.
Cameron Machine Co., Brooklyn, N. Y.
Hamblet Machine Co., Lawrence, Mass.
Meisel Press Mfg. Co., Boston.
Samuel M. Langston Co., Camden, N. J.

SOOT BLOWERS
Diamond Power Specialty Corporation, Detroit, Mich.

SODA ASH
Diamond Alkali Co., Pittsburgh.
Edw. Hill's Son & Co., New York City.
Solvay Process Co., Syracuse, N. Y.

SPECIAL MACHINERY
Nordberg Mfg. Co., Milwaukee, Wis.

SPEED CHANGES
Moore and White Co., Philadelphia.

SPEED REDUCERS
Foote Bros. Gear & Machine Co., Chicago.
D. O. James Mfg. Co., Chicago.
W. A. Jones Fdry. & Mach. Co., Chicago.

SPEED REDUCTION UNITS
Cleveland Worm & Gear Co., Cleveland, O.
Foote Bros. Gear & Machine Co., Chicago.
D. O. James Mfg. Co., Chicago
W. A. Jones Fdry. & Mach. Co., Chicago.

SPEED TRANSFORMERS
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

SPIRAL GEARS
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

SPRAY NOZZLES
Buffalo Forge Co., Buffalo, N. Y.

SPROCKETS
Morse Chain Co., Ithaca, N. Y.

STEAM GENERATORS (Electric)
Electric Furnace Con. Co., Philadelphia.

STEAM REGULATORS (For Dryers)
W. P. Pickles, Rockland, Conn.
The Fulton Engineering Co., Middletown, Ohio.

STEAM TURBINES
Moore Steam Turbine Corp., Wellsville, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Terry Steam Turbine Co., Hartford, Conn.

STEEL PLATE CONSTRUCTION
The Biggs Boiler Works Co., Akron, O.
Hendrick Mfg. Co., Carbondale, Pa.
Riter-Conley Co., Pittsburgh.

STOCK CIRCULATING SYSTEM
Claflin Engineering Co., Lancaster, O.
Ticonderoga Machine Works, Ticonderoga, N. Y.

STOCK PUMPS
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.

STORAGE TANKS (Steel)
The Biggs Boiler Works Co., Akron, O.
Riter-Conley Co., Pittsburgh.

STRAINERS
A. D. Cook, Inc., Lawrenceburg, Ind.

STRUCTURE STEEL PAINT
Detroit Graphite Co., Detroit, Mich.

STUFF CHESTS
Noble and Wood Mach. Co., Hoosick Falls, N. Y.

STUFF PUMPS
Noble and Wood Mach. Co., Hoosick Falls, N. Y.
De Laval Steam Pump Co., Trenton, N. J.

SUCTION ROLLS
Sandusky Foundry & Machine Co., Sandusky, O.

SULPHITE (Strong Bleached and Easy Bleaching)
The Borregaard Co., Inc., New York City.

SULPHITE FITTINGS
Eastwood Wire Mfg. Co., Belleville, N. J.

SULPHITE MACHINERY
The Biggs Boiler Works Co., Akron, O.

SULPHUR
Union Sulphur Co., New York City.

SULPHUR BURNERS
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

SUPERHEATERS
Power Specialty Co., New York City.

TANKS (Iron and Steel)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., Cincinnati.

TANKS (Oil)
Biggs Boiler Works Co., Akron, O.

TANKS (Paint)
Biggs Boiler Works Co., Akron, O.

TANKS (Jacketed)
Biggs Boiler Works Co., Akron, O.

TANKS (Wooden)
Hauser-Stander Tank Co., Cincinnati.
E. F. Schlichter Co., Philadelphia, Pa.
Stevens Tank & Tower Co., Auburn, Me.

TANK PAINT
Detroit Graphite Co., Detroit, Mich.

TANKS AND TOWERS
Stevens Tank & Tower Co., Auburn, Me.

TOWERS (Loading and Unloading)
Robins Conveying Belt Co., New York City.

TRANSMISSION MACHINERY
Dodge Mfg. Co., Mishawaka, Ind.
Foote Bros. Gear & Mach. Co., Chicago.
T. B. Wood's Sons Co., Chambersburg, Pa.
D. O. James Mfg. Co, Chicago

TURBINE (Steam)
Moore Steam Turbine Corp., Wellsville, N. Y.
Terry Steam Turbine Co., Hartford, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TURBINES (Hydraulic)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Holyoke Machine Co., Holyoke, Mass.
A. Plamondon Mfg. Co., Chicago.

UNIFLOW ENGINES
Nordberg Mfg. Co., Milwaukee, Wis.

VACUUM PUMPS
The Nash Eng. Co., South Norwalk, Conn.

VACUUM SYSTEMS
Open Coil Heater and Purifier Co., Indianapolis, Ind.

VALVE FACING TOOLS
The Draper Mfg. Co., Port Huron, Mich.

VALVES
The Crane Co., Chicago.
G. M. Davis Regulator Co., Chicago.
Dayton Globe Iron Wks., Dayton, O.
Eastwood Wire Mfg. Co., Belleville, N. J.
Jenkins Bros., New York City.
Lunkenheimer Co., The Cincinnati.
The Wm. Powell Co., Cincinnati.
Reading Steel Casting Co., Inc., Bridgeport, Conn.

VALVES (Air Compressor)
Hooven, Owens, Rentschler Co., Hamilton, O.

VALVES (Digester)
Eastwood Wire Mfg. Co., Belleville, N. J.

VALVES (Throttle)
Hooven, Owens, Rentschler Co., Hamilton, O.

VAPOR ABSORPTION SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Engineering Corp., New York City.
B. F. Sturtevant Co., Hyde Park, Boston.

VATS (Steel)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., Cincinnati.

VENTILATING SYSTEMS
American Blower Co., Detroit, Mich.
Arex Company, Chicago.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Engineering Corp., New York City.
B. F. Sturtevant Co., Hyde Park, Boston.

VULCANIZERS
Biggs Boiler Works Co., Akron, O.

WASHER WIRES
Eastwood Wire Mfg. Co., Belleville, N. J.
The W. S. Tyler Co., Cleveland, O.
Wisconsin Wire Works, Appleton, Wis.

WASTE PAPER STOCK
Mendelson Bros. Paper Stock Co., Chicago.

WATER FILTER
Glens Falls Machine Co., Glens Falls, N. Y.
Hungerford & Terry, Inc., Clayton, N. J.

WATER-SOFTENING AND PURIFYING SYSTEMS
The Permutit Co., New York City.
Wm. B. Scaife and Sons Co., Oakmont, Pa.

WATER WHEELS
Holyoke Machine Co., Holyoke, Mass.
The James Leffel and Co., Springfield, Ohio.
A. Plamondon Mfg. Co., Chicago.

WET MACHINES
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.
Smith & Winchester Mfg. Co., So. Windham, Conn.

WHEELS (Sprocket)
Robins Conveying Belt Co., New York City.

WOOD GRAPPLES
Industrial Works, Bay City, Mich.

WOOD PIPE
The Michigan Pipe Co., Bay City, Mich.
A. Wyckoff & Son Co., Elmira, N. Y.

WOOD PRESERVATIVES
Detroit Graphite Co., Detroit, Mich.

WORM DRIVES
Cleveland Worm & Gear Co., Cleveland, O.

WORM GEARS
Foote Bros. Gear & Mach. Co., Chicago.

WIRE SIGNS
Cheney Bigelow Wire Works, Springfield, Mass.

CHEMICAL STONEWARE

FIGURE 272-A FIGURE 272-B
ACID PROOF 90° AND 45° BELL AND SOCKET ELBOWS
Also Make Any Degree Elbow

WRITE FOR COMPLETE CATALOG

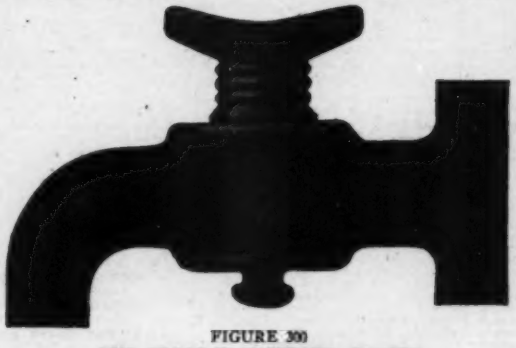


FIGURE 300
ACID PROOF FLANGED BIB FAUCET

FIGURE 273
ACID PROOF "T" BELL AND SOCKET PIPE

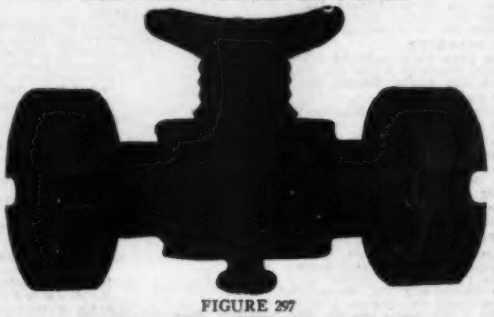


FIGURE 297
FLANGED STRAIGHT-WAY STOPCOCK

A Stoneware that is Acid-Proof and Vitrified All Through. Our Ware is Not Dependent Upon a Glaze, Enamel or Veneer

Our ware is not the cheapest
But it must be right

Our ware is not fancy
But it is guaranteed

FIGURE 271
STRAIGHT LENGTH SOCKET PIPE

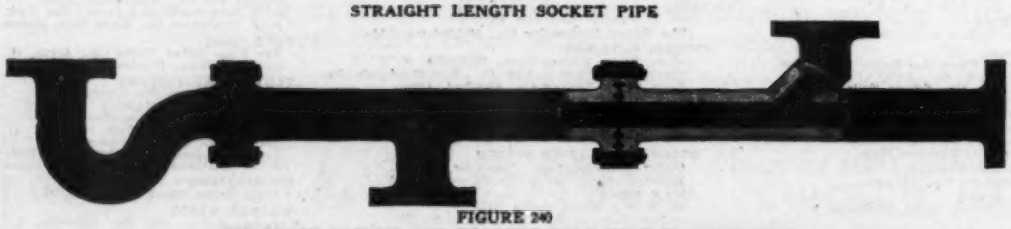


FIGURE 240
ACID PROOF GROUND AND GROOVED BOLT HOLE FLANGED PIPE

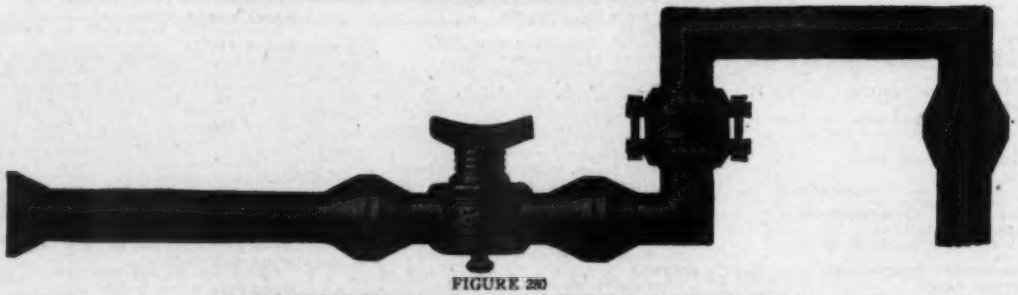


FIGURE 280
ACID PROOF CONICAL FLANGED PIPE LINE AND FITTINGS

MAURICE A. KNIGHT Office and Factory Kelly Avenue **AKRON, OHIO**

Made by Us Continuously for 18 Years

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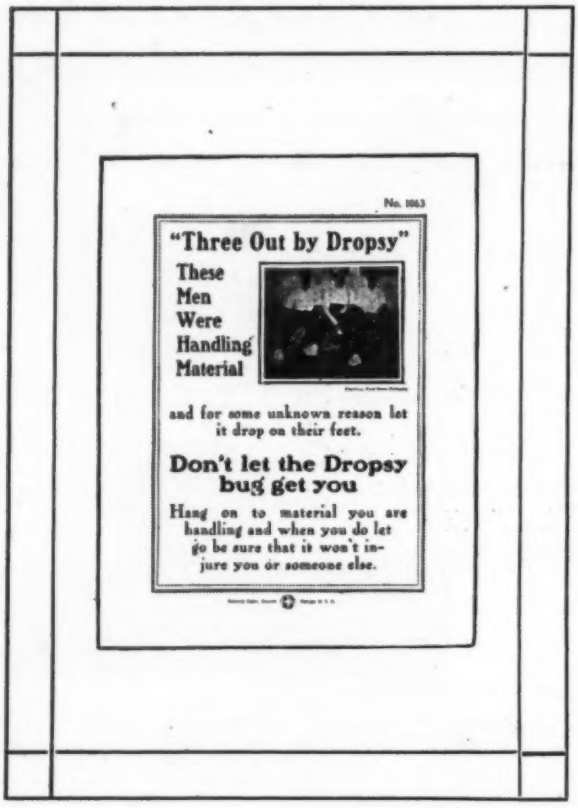
No. 1063
"Three Out by Dropsy"
These Men Were Handling Material
and for some unknown reason let it drop on their feet.
Don't let the Dropsy bug get you
Hang on to material you are handling and when you do let go be sure that it won't injure you or someone else.

36 New Safety Bulletins Each Month

Will Make Your Shop Bulletin Board As Interesting As a Newspaper

All posters attractively printed in two colors. Sizes 9"x12" and 17"x23".

Members of the National Safety Council receive 36 different safety posters each month —extra copies as desired. A new bulletin every day!

OUR SAFETY BULLETINS attract the workers' attention, and hold their interest. No highbrow stuff—they don't shoot over the heads of the workmen! Simple, yet full of human interest, they put the safety message across in a way that sticks! Results? They have helped many of the Council's members in the Paper and Pulp Industry to reduce accidents 75 per cent or more because they instruct, they stimulate safety thinking, and they develop the safety habit among the men.

SAFETY BULLETINS comprise only one item of the service you will secure through membership in the National Safety Council—a non-profit, co-operative association of 3,500 employers helping each other to reduce the cost of accident to their workers.

Write for sample safety bulletins today—post them on your bulletin boards and watch the results

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Co-operative Dept. P-2 Not-for-profit

168 North Michigan Avenue Chicago

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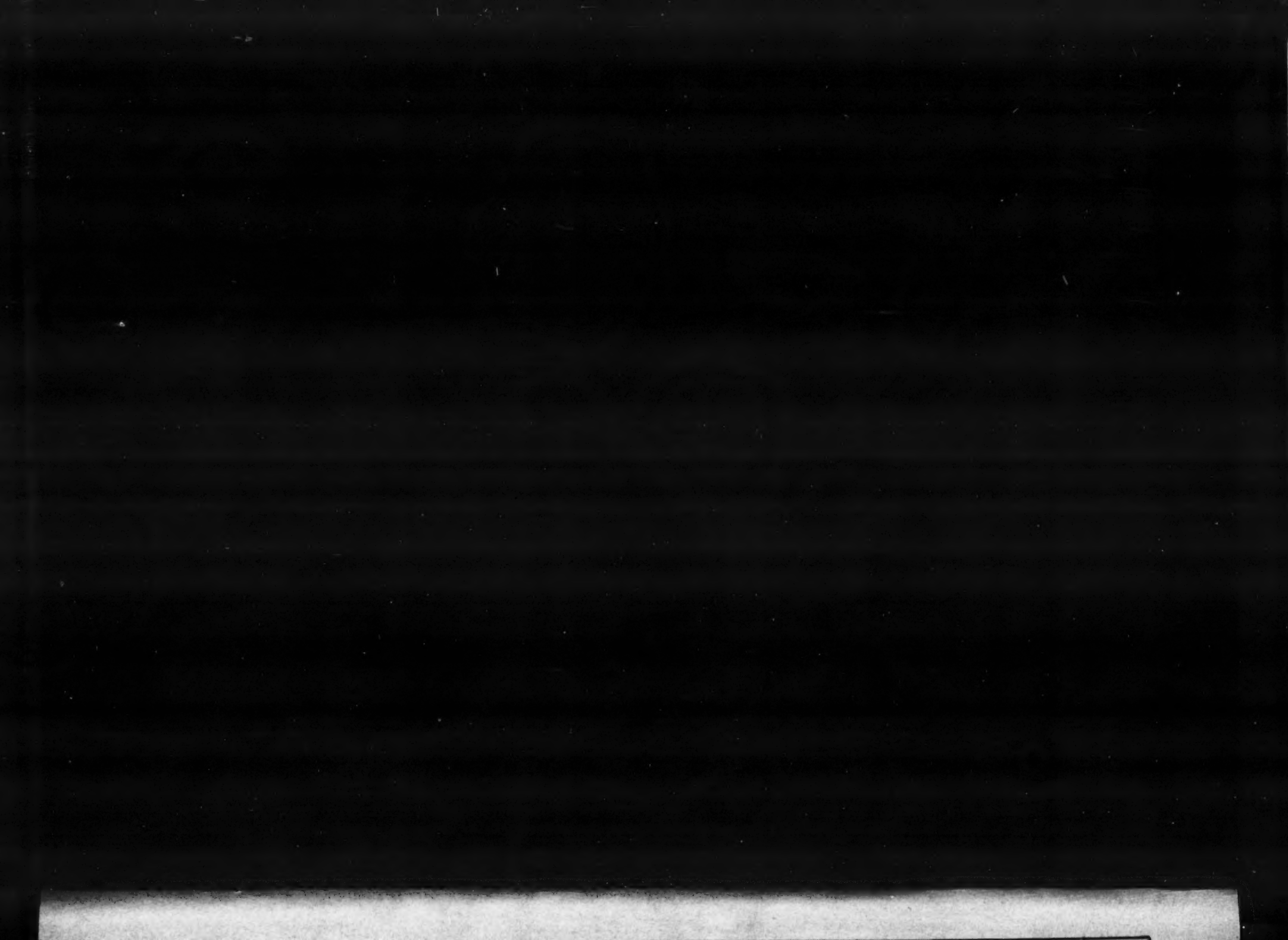
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